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ABSTRACT

This manual presents a curriculum to improve young people's appreciation of the environment and their outdoor behavior. The first two chapters review the curriculum development process and suggest ways to promote the program and win administrative approval. The third and fourth chapters outline steps for program planning and implementation: determining objectives, identifying instructional units, estimating costs, planning lessons, acquiring resources, budgeting and purchasing, training instructors, and evaluating the program. Other chapters provide lesson plans on specific topics: (1) wildlife characteristics, ecology, and management; (2) hunting history and controversy and hunter safety, ethics, and skills; (3) fish ecology, anatomy, species, and habits; fisheries management; and fishing techniques and etiquette; (4) hiking and camping ethics, techniques, and skills; and (5) survival skills, including controlling the mind, maintaining well-being, first aid, and directional skills. Each of these sections contains a topic outline, topic overview, statement of general behavioral objectives, student activities, and a resource list of books, magazines, organizations, board games, teaching packages, and computer software. The manual includes an outline of basic principles of wildlife management and glossaries of educational and ecological terms. (SV)

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ENVIRONMENTAL RESPECT

Curriculum Activity Guide

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Eugene Decker

Safari Club International
Conservation Fund

ENVIRONMENTAL RESPECT

by
Albert R. Huck
and
Eugene Decker

Art by
Dorothy Downing
Nancy Robinson
Cynthia Wong

A Cooperative Effort of

Colorado State University
Department of Fishery and Wildlife Biology
Department of Education
Safari Club International Conservation Fund

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A New Approach to Outdoor Education

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Environmental Respect Manual
5151 E. Broadway, Suite 1680
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2nd Edition 1987

Dedicated to the American Sportsmen —

their efforts have been unequaled in the conservation of our wildlife and wild lands.

Preface

This manual has been made possible by a grant from the Safari Club International Conservation Fund (SCICF) to Colorado State University. The SCICF is a conservation education foundation established by Safari Club International, a group of American sportsmen dedicated to various phases of wildlife conservation. This manual represents a major effort by this organization to bring about improved appreciation of our wild environments and better outdoor behavior by our young people, the citizens of tomorrow.

It is our plan to revise this manual again after several years. We urge all who use it to send us their suggestions for improvements. We especially will welcome additional resource materials and new successful student activities you may develop. Please send your ideas to Education Director, SCICF. Your cooperation with this effort will be greatly appreciated.

If you would like to learn more about Safari Club International and its programs, please address your inquiries to:

Safari Club International, Headquarters
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A special thanks to April Fletcher, a dedicated conservationist, for her sound suggestions and recommendations during the editing and typing of the first edition of the manuscript. Cynthia Wong, Tracy Feldman and Pat Larson provided valuable assistance with editing the second edition.

One person who deserves great credit is the wife of the senior author, Teresa Huck, for offering unlimited help, patience and support during the duration of the project.

We would also like to acknowledge the fine cooperation of Dorothy Downing, Nancy Robinson and Cynthia Wong in providing the original art. Their contribution has enhanced the message of this manual.

A final thanks to the many students, educators and sportsmen who made this effort so rewarding.

Albert Huck
Eugene Decker
Fort Collins, Colorado 1987

Introduction

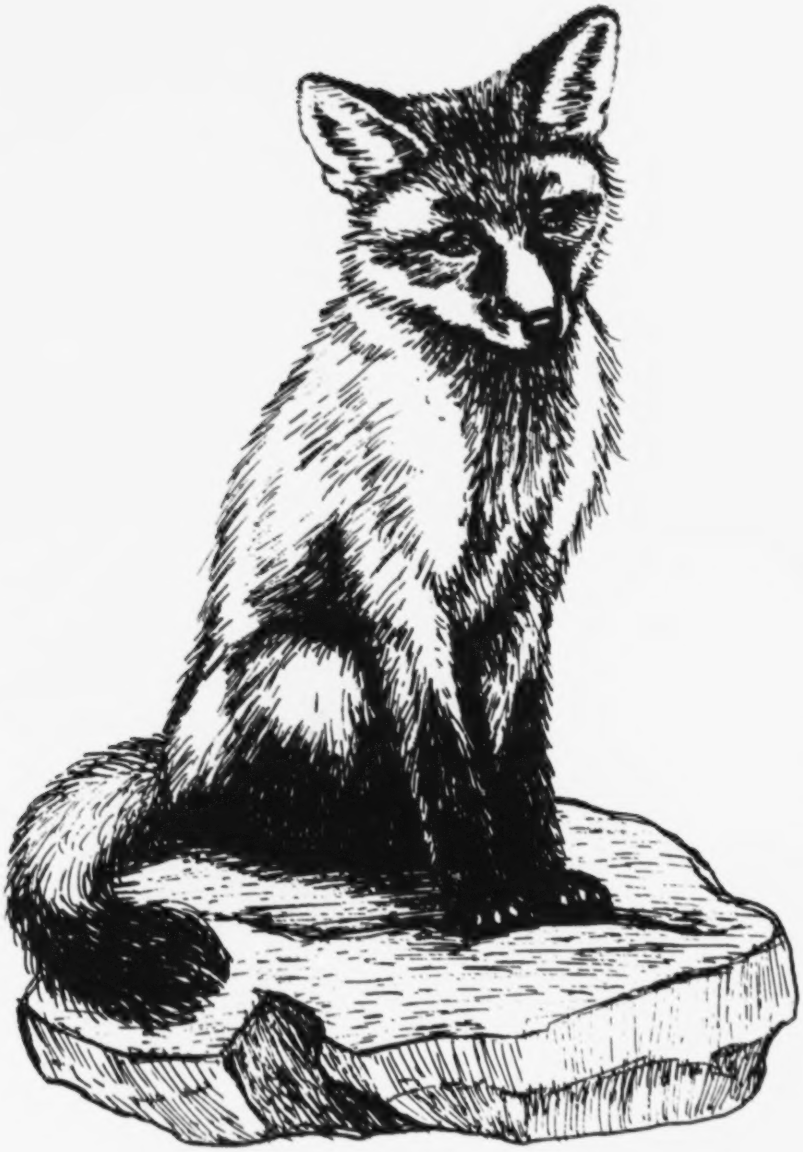
Every year more Americans are denied opportunities for outdoor recreation because of the poor conduct of others. Although bad behavior by hunters receives most of the publicity, fishermen, hikers, campers and naturalists also suffer due to the unacceptable sloppy outdoor manners of many of their associates. This has resulted in the posting of much private property against all entry, restricted use of some public land, and a generally poor public attitude toward outdoor recreationists. We often hear about the "slob hunter," but we must remember that there are also probably more "slob" anglers, campers and others whose littering, vandalism and other thoughtless actions damage the environment and lower the quality of the outdoor experience for others. Such deeds continue to damage the image of the conscientious outdoor recreationist.

The reasons for the bad manners of increasing numbers of outdoor recreationists are many and complex. However, we believe a major factor is that they have had little opportunity for exposure to an "outdoor ethic" from either their family, friends or associates. Now, with the increasing popularity of outdoor activities, these people find it easy to become instant outdoor recreationists. The basic equipment is easily available, and some degree of minimum skill can usually be acquired in a short time for most activities. We believe that much of their subsequent poor manners in the field are caused by "thoughtlessness." In other words, they don't know any better.

The next question is obvious — where can people learn "outdoor etiquette"? This manual is concerned with young people, the citizens of tomorrow. We feel the best place for training youth is within the existing educational system, with professional teachers in an academic atmosphere. A good teacher who is a dedicated outdoor person can convey his or her feelings about outdoor behavior most effectively. Such teachers' concerns and enthusiasm for responsible outdoor citizenship can result in adoption of lifelong behavior patterns by the students.

"Environmental Respect" is our attempt to assist concerned private citizens and educators in establishing a program in schools dealing with outdoor manners. This curriculum manual develops the concept that users of the outdoors should develop *respect*. This *respect* should be considered for the environment (the land, water, air, plants and animals) and for people (landowners, other recreationists, non-participants and themselves). Through an acceptance of this concept of RESPECT along with some recreational skills, we hope that the students will become better outdoor citizens. All outdoor recreationists will benefit — angler, hunter, hiker and naturalist alike. If such behavior is accepted by some of our young people who are involved with Environmental Respect activities, then our objectives will have been met.

Although there are a number of excellent curricula and activity guides now available on natural resource subjects (Project Wild, Project Learning Tree, CLASS Project, Missouri and Kansas programs, and several others), we feel that this manual, Environmental Respect, can serve as a supplement for teachers wishing to include outdoor recreation activities in their programs. We are also pleased that several people have used this manual with their hunter education classes.



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The trouble is that it took half my life before I realized it was a do-it-yourself job.

EARTH SCIENCE CURRICULUM PROJECT

CHAPTER 1

Using this manual

For the Professional Educator

Teachers with high regard for the natural environment and who enjoy outdoor sports can be significant factors in improving outdoor behavior of today's youth and tomorrow's society. With the aid of this manual, you, the concerned educator, not only may enrich your often tedious day-to-day teaching routine but also may offer a greatly needed phase of outdoor education, Environmental Respect. It has been proven that both learning and teaching improve when pleasure is involved, so why not initiate a course now that may well revitalize an entire school program as well as help to assure the better use of our natural resources.

There is considerable variation among school systems regarding how much "say" the teaching staff has in developing and adopting new curriculum programs. Many school districts have detailed procedures readily available which describe how teachers, students and lay persons alike may be involved in the curriculum *process*. In other systems, however, change is seldom heard of or the administration plays an autonomous decision-making role. In either case, educators can always profit by examining their school's curriculum process and then plan how they can affect favorable program change.

The *curriculum process* as referred to here means the total methodology involved in planning, implementing, evaluating and modifying a new or existing program. A *program* for our purposes, refers to a course of study such as Outdoor Education. With differing state education guidelines, community needs and school philosophies, it must be understood that no single curriculum process exists. Consequently, educators should identify their school's unique curriculum process and utilize the suggestions offered in Chapters 2, 3 and 4 to supplement their own curriculum adoption strategies.

The curriculum lesson ideas offered in Chapters 6-10 of this manual bring out the unique qualities of our Outdoor Education philosophy. Because Outdoor Education includes most forms of education in, for, and about the environment and the out-of-doors, it becomes essential to distinguish our particular approach from all others in terms of a specific curriculum. Each area of study, such as Investigating Wildlife, begins with a statement of intended purpose and a suggested approach. The problem associated with most outdoor education courses is that they teach students *about* the out-of-doors without imposing any behavioral responsibilities on *how to care for* the out-of-doors. Too often it becomes acceptable to simply imply the need for outdoor manners.

Chapters 6-10 provide behavioral objectives and activity ideas which place respectful behavior as the essence of each unit rather than as an abstract program *goal*. Therefore, whether teachers choose to use these specific units of study and activity ideas or not, the purpose here is to emphasize a method for developing outdoor RESPECT in our younger citizens by utilizing a most interesting form of outdoor education, the outdoor sports, as the medium.

Finally, a Resource portion of each unit and an appendix cover the sources of materials suitable to teaching such a program. Based on your community needs, the best method for uncovering resources involves an individual search extending from local prospects to nation-wide organizations. The listing here will serve as a time-saving starting point. Because of the rapid turnover in materials and their sources, please do not consider this listing complete. Identifying and building up resources is a necessary ongoing process for each teacher.

For the Outside Lay Person

Nothing seems more frustrating to a concerned citizen than seeing local educational needs going unmet. We anticipate that many sportspersons, including hikers, hunters, campers and naturalists, will be interested in having a program in outdoor citizenship available in their local school system. The question is, how can you, an outsider, go about installing such a course as part of the total school program?

Usually the best approach involves contacting an avid outdoorsperson who is already a part of the school's professional staff. Working from within, with solid support from the outside, will probably assure the greatest opportunity for success. At any rate, as an outsider, the best method for installing a desirable program, such as Environmental Respect, involves becoming familiar with the rules of the game. In other words, learn the education curriculum process yourself and know how to best attain desired results.

If open communication channels do not exist between the school and its patrons, serious misconceptions and related school/community problems can develop. School operations, especially those concerning what and how something is taught, often appear as a total mystery to those citizens who are not well versed or concerned with educational jargon. It is no wonder that most "outsiders" avoid getting involved with modifying or changing a program of study. Also, with a misinformed public, it is understandable why some of those who do come forth with new ideas are turned down because of a poorly planned proposal. As a result, the schools may become a system which is funded by the public yet closed to general public participation for anything other than token public relations activities.

Chapters 2 and 3 of this manual outline the general requisites for designing an acceptable new program proposal. Whether the initial idea comes from an individual or a citizen's group, a close working relationship must be established between the school and the proposers. Although this guide outlines the entire curriculum process, stages which are critical areas for public participation are emphasized. Hence, be sure you are well acquainted with the entire curriculum process. This will help you know where and when to come forth with decisive input.

Chapter 4 is largely a matter of school business. The administration is the only group aware of the total picture and the limiting constraints. It is necessary for laymen to have an idea of these internal operations to determine the feasibility of their plans. Such a wide perspective is also useful if one intends to take the program to another outside agency.

Chapters 6-10 are the meat of the action. The objectives and lesson ideas given here can be used to modify any existing outdoor-related program. However, the ideal would be to start from ground level and work up. Individual community needs and resources will dictate what areas of instruction to use. The important factor lies with the ability of the reader to recognize how goals, focused around developing responsible outdoor behavior, are accomplished through unique activities designed to meet specific objectives. Too many of us have jumped on the outdoor education bandwagon without deciding upon any specific direction to take. It is up to you, a school patron, to see that desired program outcomes are being met — and one way to do this is by knowing what and *how* the subject is being taught.

An Overview of the Curriculum Process

The acceptance of any new program by the school administration depends on several factors. Some of these include:

1. Is the proposal complete, well organized and easily understood?
2. Does the new program meet identified school/community needs?
3. Will the program fall within the school district's overall purpose and educational program?
4. Does it have general appeal to the students, staff and community?
5. Will the program be economically feasible in terms of the needed resources and the anticipated benefits?

Upon initial acceptance, the task remains to insure smooth operation of the program by providing the necessary resources and continually evaluating its operations. This total plan of action is often called the *curriculum process*. Each phase of the process forms an essential component to the total program. The following schematic provides an overview of the concepts found in Chapters 2, 3 and 4.

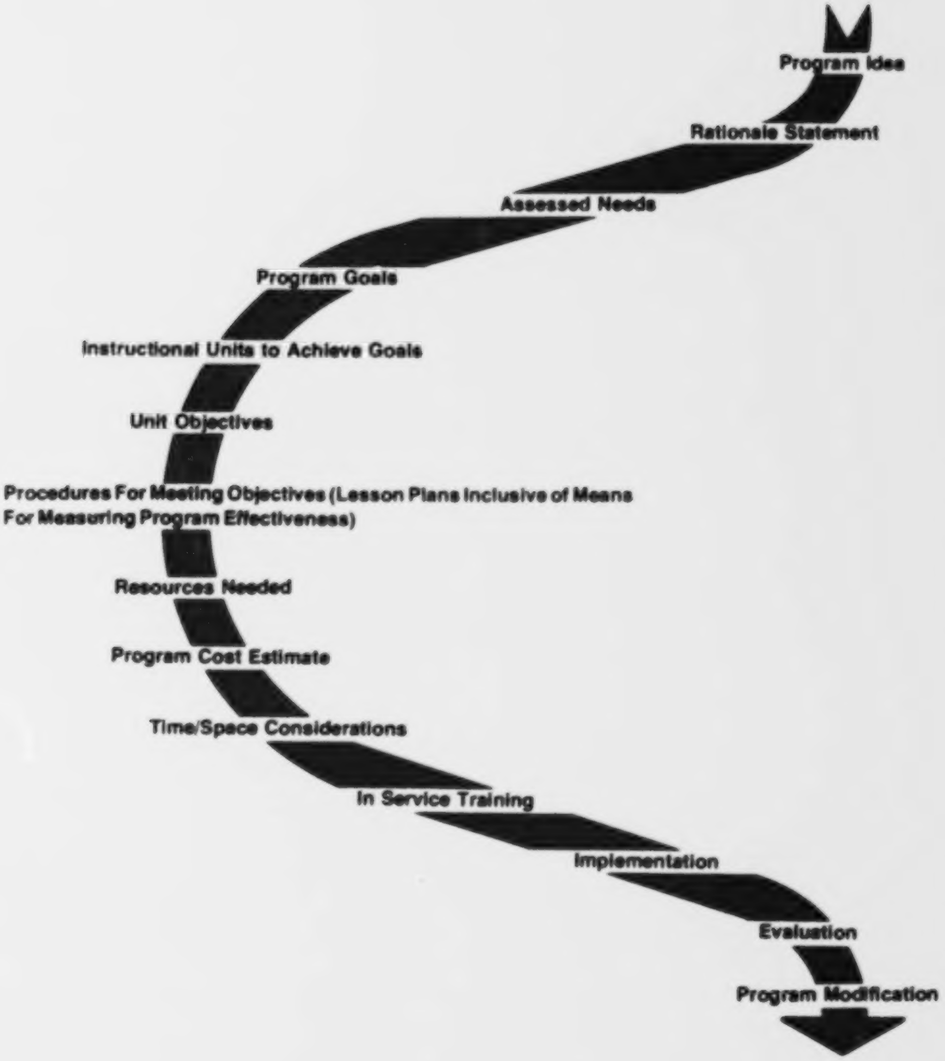
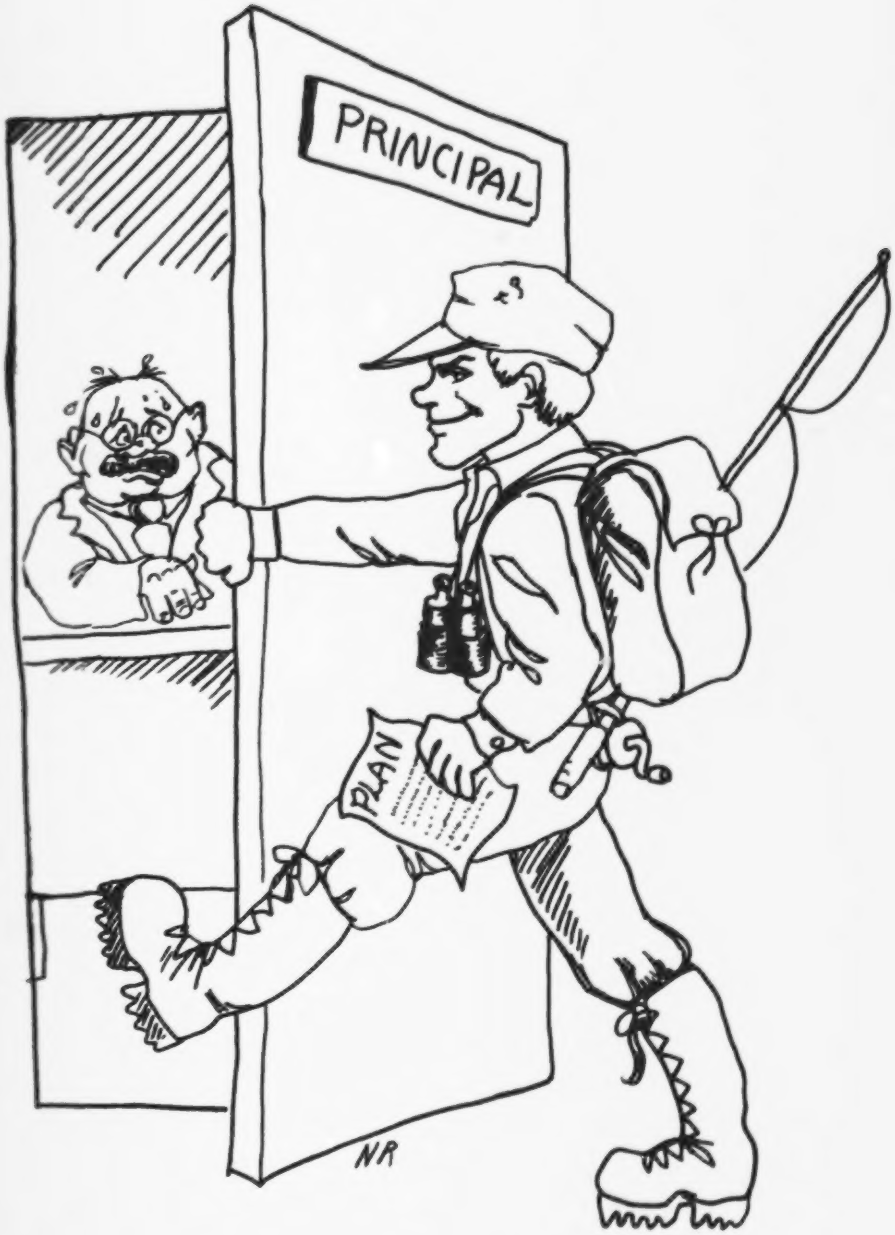

Program Idea
Rationale Statement
Assessed Needs
Program Goals
Instructional Units to Achieve Goals
Unit Objectives
Procedures For Meeting Objectives (Lesson Plans Inclusive of Means For Measuring Program Effectiveness)
Resources Needed
Program Cost Estimate
Time/Space Considerations
In Service Training
Implementation
Evaluation
Program Modification

FIGURE 1. The Curriculum Process: Phases of Curriculum Development.


PRINCIPAL
PLAN
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Getting your foot in the door

16

CHAPTER 2

Developing the program proposal

Administrators are so accustomed to seeing program proposals come and go that they can be likened to a wary mother who discourages the wants of her overzealous child while wandering through a toy store. Both mothers and administrators know that after the novelty of newness wears off, only memories of wasted time and money remain.

You should expect the highest degree of skepticism from administrators especially when dealing with any form of outdoor education. This particular subject area can fall easily within the "new toy syndrome" because of recent concern about the environment and the unlimited supply of "armchair experts." Therefore, the proposer of a new program should anticipate this administrative attitude by carefully and logically preparing the proposal so it is attractively packaged while still showing its obvious assets and innovations.

A completely ready-to-use program is rarely accepted by a school system because it usually lacks specifications for the individual community needs. For this reason, the school and community will be expected to combine efforts in planning the curricular change. The best means to facilitate such an operation will likely come from the efforts of a special Curriculum Task Committee. To assemble such an organization you will first need to prepare a preliminary program proposal; obtain initial administrative approval to select a committee; and then prepare a program promotional plan to elicit committee members.

Initial Administrative Approval

If you can obtain administrative backing from the very beginning, the future tasks of planning and implementing will be much easier. Contact either the district's administrative official in charge of secondary instruction or a building principal. This depends on what level you want to start — either a district-wide program or a single school program. In most instances, starting with a single school at the junior high level proves most favorable for program expansion after a first successful year. In this case, the principal is the key person.

Figure 2 offers a suggested format for the initial program proposal. Keep in mind that this only offers a rough sketch of what the Curriculum Task Committee will thoroughly plan out at later stages of curriculum development.

As an outsider, you may need technical advice from school professionals to prepare this initial proposal. Ask students or teachers for the name of a person who might be interested. A teacher or administrator who is also an avid sportsperson or outdoor enthusiast may be your best bet.

After you do your homework of estimating the effectiveness of other similar programs in your area and estimating the community interest and needs in the outdoor sport areas, you are ready to make the initial contact with the administrator. As mentioned, the more attractive and organized the proposal, the greater your chances are of success. Contacting a building principal who is already a concerned sportsperson is an ace in the hole.

When approaching this first administrator, the proposer should attempt to control as many favorable conditions as possible. Factors such as the time of year and the time of day are essential. Curriculum change proposals are usually considered during late fall to provide adequate time for planning for the following year's classes. Remember, your task is to seek the administrator's advice on the feasibility of your proposal, rather than telling, ask what should be done.

---

1. **PROGRAM TITLE** Concise, simple. Reflects the nature of the educational purpose (i.e., outdoor sportsmanship).

2. **PROGRAM RATIONALE** A brief description of why such a program is justified. You may wish to support your statements with local statistics, anecdotes, and student/community needs.

3. **PROGRAM DESCRIPTION** Describe what the program will involve in terms of major activities, their nature and scope.
   Stress how ethical behavior toward the environment and fellow man can be incorporated in outdoor sport-related activities which have unlimited carry-over to everyday living situations.

4. **PURPOSE** A statement of intentions. Avoid issue-oriented motives. Include such things as developing responsible behavior, reducing recreational area impacts, building student self-esteem, and improving the safety consciousness of students.

5. **PROGRAM STRUCTURE** Units of study to be included, such as wildlife, fishing, hunting, camping and survival.
   Classify sub-units in orderly sequence. Topic outlines may be presented here also.

6. **PROGRAM GOALS** Broad general statements of the timeless outcomes expected. These may be sub-categorized into program goals (methods), teacher goals, and student outcome goals.
   See "determining goals" in section 3 for examples of program goals coincident with the overall school district's goals.

7. **PROGRAM OBJECTIVES** Explicit, measurable, expected outcomes which describe how the goals can be attained.
   Objectives can either deal with developing skills, attitudes, or knowledge.

8. **PROGRAM EVALUATION** Criteria and methods used to measure whether objectives have been met.

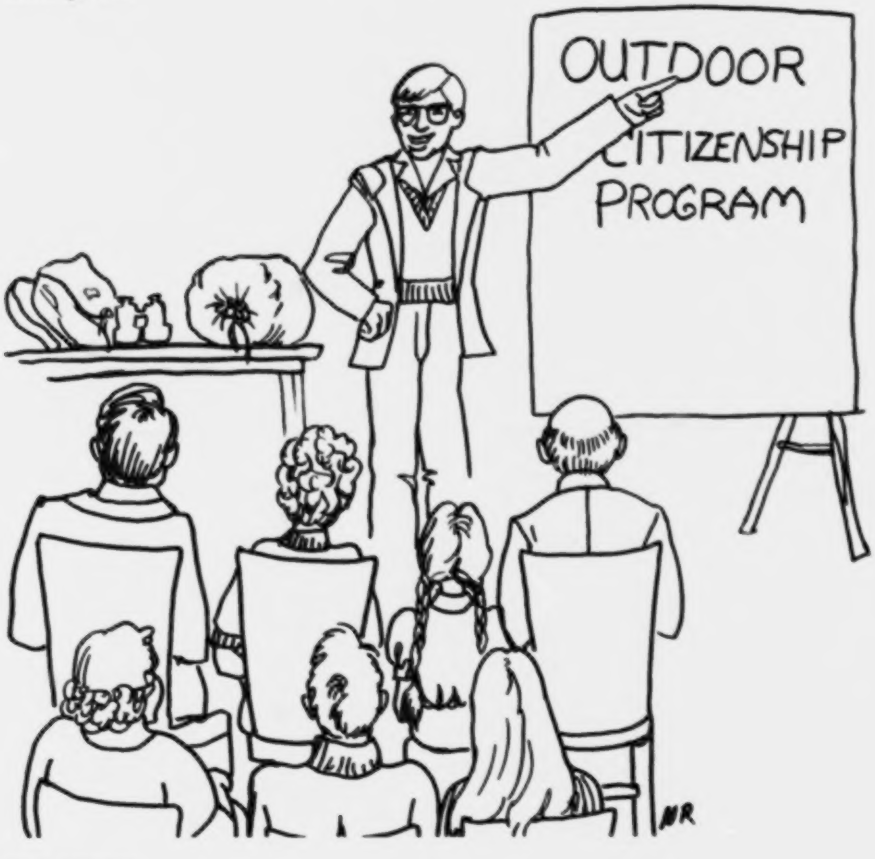
9. **PROGRAM COST ESTIMATE** A general list of materials and costs for the activities described. Also include the expected program size (number of students), and the amount of time involved.

FIGURE 2. Format for Writing Initial Program Proposal

Program Promotion

Any curriculum change must involve staff, student and community input from the onset of the idea. As a means of informing these groups and obtaining volunteer help for the curriculum task committee, a self-contained presentation about the program would offer highest returns by virtue of its intrinsic public relations value. This promotional plan might include:

- an audio-visual slide presentation,
- guest consultants representing other successful programs,
- community student representatives voicing a need, or
- expression of community support by representatives of sportsmen groups, nature society, etc.



Selling your program

The five questions asked on page 3 in Chapter 1, "Overview of the Curriculum Process," should be answered. Using your proposal as a guide, the presentation should emphasize the assets and innovations in a simple, complete and interesting manner.

Groups interested in this presentation might include:

1. Parent/teacher organizations
2. The curriculum review council
3. Teaching staff during a faculty meeting
4. School principals during a district-wide meeting
5. Local service clubs and related sportsmen and nature organizations
6. Student assembly.

At each presentation record suggestions or criticisms. Depending on the number of presentations and your audience size, it may be helpful to pass out and collect information sheets asking for suggestions and volunteer help. Keep the early presentations confined to small groups with inherent interests in outdoor education until a base of support has been established.

The Curriculum Task Committee

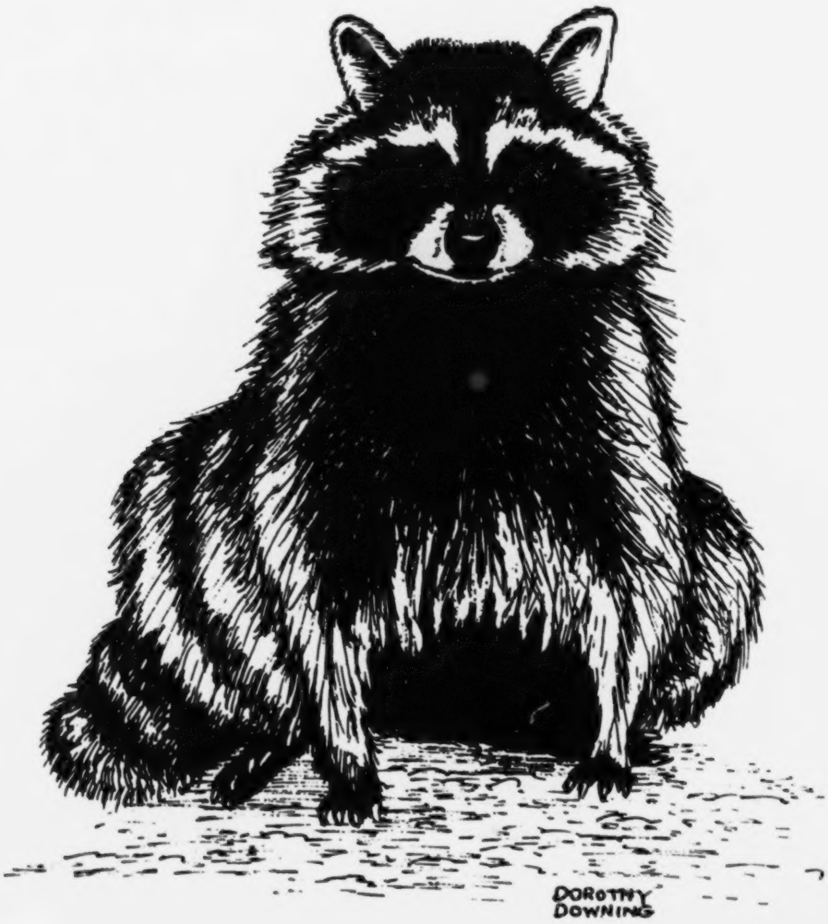
As mentioned, the specific curriculum development process varies considerably between school districts. But, for the most part, a curriculum committee is usually given the major responsibility of writing the curriculum and following through with implementation duties. Consequently, this group's leadership, size and composition are of critical importance. To be workable, the groups should be as small as possible; a suggested size might be five to 10 people; a recommended composition would include several teachers, a curriculum specialist, and a principal or assistant principal.

Basically, the duties include:

1. An election or administrative appointment of the committee chairman
2. Description of the group's purpose. Is it entirely responsible for curriculum development or will it function as advisory only?
3. Identification of a specific plan of action such as:
   - Refining a final proposal
   - Submitting and following the proposal through
   - Developing the curriculum
   - Proceeding with ongoing implementation tasks like providing for in-service training, evaluation and program modification

For a more efficient operation, first function as a group working out the committee's purpose and program proposal strategy. Once members have passed through the expected griping and groping stages so common to initial personal interaction, grouping toward teamwork begins and accomplishments can be made.

Assuming the Board of Education has approved the final proposal, the committee should be ready to develop the overall curriculum. The leader may first want this team to collectively develop the program's philosophy. Subcommittees could then be formed to assess the specific needs of different segments of the school and community. If necessary, subcommittees might also determine the scope and effectiveness of similar existing programs such as the State Conservation Department's Hunter Education Program.



OUTDOOR
SPORTSMANSHIP
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"A sound philosophy sets the stage for good actions"

CHAPTER 3

Writing the curriculum

The final curriculum and the proposal may be one and the same. In most cases, however, a school administrator will approve an idea but final program acceptance is up to the Board of Education after the details have been worked out. Hence, close communication with principals and others who will ultimately be involved with implementation is essential. Whatever the principal recommends usually goes.

The Outdoor Sportsmanship Philosophy

Whatever your title is, the idea is the same. The purpose of this manual is to help educators develop an instructional strategy that will manipulate students into becoming responsible, ethical outdoor citizens. Manipulate may come as a harsh word, but that is essentially what it may take to affect behavior in this way. Education is full of hypocracies, and to avoid such here the philosophy must honestly represent the program intentions. This casts the framework for everything to follow from goals to the method of evaluation.

Philosophies are difficult to deal with as a group because of the diversity of values. But a statement must be developed through compromise; otherwise efforts will be divided from the beginning. The following suggests what we are striving for:

> *The philosophy of Outdoor Sportsmanship stresses developing and strengthening the vital responsibilities the student has for himself, the natural environment, and his fellow man. Growth in these responsibilities will be evidenced by changes in attitudes, knowledge and skills by utilizing those outdoor recreational sports which are of high interest as the instructional medium.*

Assessing Needs

Usually there are a number of issues at hand (for example, a program bringing additional costs or advocating the use of firearms in the school) however, a reliable survey may provide a sturdy defense platform to meet the gripes of any "axe-grinders." But, even more important, assessing needs provides your group with helpful information for planning specific goals and instructional units.

Surveying is similar to "taking the temperature" of the community. Limited time, money and personnel will probably necessitate a partial survey anyway. Besides, the more information you collect, the more you will have to interpret. Therefore, the rule of thumb with surveys is: Keep it short and simple and limited to the "captive publics," or those who will be directly involved. For this purpose, I suggest composing two or three brief questionnaires to be given to the students, parents and staff members. Figure 3 offers some basic guidelines for designing a survey.

1. **INITIAL CONSIDERATIONS***
    - **Do we need the survey?**
    - **Have we obtained administrative permission to survey?**
    - **What do we need to know?**
    - **How will we get the needed information?**
    - **Where will we get this information?**
    - **How will we use the information?**
2. **QUESTIONNAIRE GUIDELINES****
    - **Provide an introductory statement which includes background information and an explanation of what you're attempting to do.**
    - **Keep your program philosophy or purpose in mind when deciding what your survey intentions are.**
    - **Design specific surveys for the different publics involved.**
    - **Avoid asking direct questions about your program — they're probably not well enough informed. Rather, design indirect "indicator" questions which will give you a feeling of needs and acceptance.**
    - **Use plain, simple language; avoid jargon, wordiness and ambiguity.**
    - **Ask questions in a positive manner that will provide the desired information.**
    - **Categorize your questions into some logical order.**
    - **Avoid slanted "iffy" or "sales-pitchy" questions.**
    - **Pre-test your survey to check for reliability.**
    - **Administer at correct time in terms of interest, and well within deadlines.**

***"Organizing and Conducting Community Surveys," Colorado State University Cooperative Extension Service**
****"How to Conduct Low Cost Surveys," National School Public Relations Association, 1973.**

FIGURE 3. Guidelines for Designing a Survey

Determining Outdoor Sportsmanship Goals

Program goals are general in nature and must have a clear relationship to both the program philosophy and the unit objectives to follow. Goal statements should also reflect the assessed needs of the parents, staff and students. However, the clincher for the Board's acceptance of the program in its final form is how well it conforms with the school system's overall goals. These system goals usually follow the nationwide goals adopted by the Educational Policies Commission.* Figure 4 represents how Outdoor Sportsmanship program goals can be patterned to fit the general goals set by the school district. Notice how these goals relate directly to the Program Philosophy. Goals 1 through 4 concern responsibility to oneself; 5 through 6 relate to fellow man; and 7 and 8 concern responsibility for the natural environment. Each program goal describes what learner outcomes are expected, how they will be accomplished, and a means of evaluation. Granted, this may sound complicated but recent trends in accountability laws force administrators to be cautious.

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*Educational Policies Commission. *National Education Association, Education for All American Youth.* Washington, D.C. The Association, 1974, pp. 225-226.

FIGURE 4. Formulating Program Goals from General Goals

GENERAL GOALS	PROGRAM GOALS
1. Mental and Physical Health	By providing specific learning experiences in the area of outdoor sports, students will develop proper attitudes, habits, emotions and skills as evidenced by acceptable levels of safety consciousness, and emotional and psychomotor control. This, in turn, will greatly reduce the chances of outdoor recreational mishaps and help preserve the future of the sport and resources involved.
2. Self-realization	Through learning experiences in the area of outdoor sports, students will test their capacities and experience self-satisfaction by meeting success on their own terms. This, in turn, promotes emotional development to a point of self-realization. This will be determined by sequential assessment inventories and observations.
3. Economic and Occupational Competence	Through learning activities related to the economics of outdoor sports and the environment, the student will comprehend the source of funding for resource conservation and the economic values of those resources and personal properties involved. An acceptible level of attainment will be determined by observation and cognitive testing. The student will also realize the potential job opportunities that exist indirectly and directly with natural resource agencies and related industries. He will understand the need for wise consumer practices.
4. Intellectual Processes	Utilizing learning experiences in outdoor sports and wildlife ecology/management, the student, submerged in high interest areas involving the outdoors, will improve powers of thinking, reasoning, analysis and interpretation to an acceptable level as determined by cognitive testing and observations.
5. Human and Social Relations	Through the delivery of specific learning opportunities in the area of outdoor sports and wildlife ecology/management, the student will appreciate and respect the rights, beliefs, values, and cultural heritage of others to an acceptable level as determined by observation and inventories.
6. Responsible Citizenship	By utilizing learning experiences in the area of outdoor sports and wildlife ecology/management, the student will comprehend to an acceptable level the nature and variety of values associated with laws, regulations, and social rules. These understandings will, in turn, promote individual conformity to legal systems that help preserve and protect our natural resources.

GENERAL GOALS	PROGRAM GOALS
7. Ethical Character	By receiving learning opportunities in the area of lifetime sports, the student will develop an understanding for truth, honesty, and integrity; ethical self-restraint from negative impulses, and a sense of honor which goes beyond the societal/legal constraints placed upon him. This will enhance the conservation and preservation of the natural resources utilized.
8. Environmental Concern	By receiving specific learning experiences in outdoor recreational sports and related areas, the student will develop awareness, appreciation, understanding and concern for the natural environment as determined by assessment inventories.

Identifying Instructional Units

Instructional units refers to subject areas taught to attain outcomes stated in the goals. The committee has to identify at this point student interest areas, teacher competencies, and resources available. For example, boating and water safety would not be practical in an area with little opportunity for water sports.

The basic criterion for selecting instructional units depends on those which would interest the greatest number of students where responsible outdoor behavior is essential.

As an example, the reason for allowing firearm training within the school is: every year hundreds of responsible hunters are chased out of the woods by those who were never taught the respect and ethics associated with the entire sport. The classroom situation certainly offers a more intensive and controlled learning environment where the finer points of sportsmanship can be effectively taught and thoroughly evaluated.

In this case, however, if such assurances are made, it is the committee's responsibility to follow through with outstanding results.

Estimating Program Costs

Before any final acceptance, the Board of Education will need to know the approximate costs of the program. They will expect an estimation of the total material and personnel costs involved.

To determine the personnel cost, the total students to participate should be divided by 30 (average class size) to determine the number of staffing units. A cost estimate for a staffing unit would be equal to whatever part of his or her total teaching time is utilized. For example, a teacher who makes $8,000 and devotes 1 staffing unit a day to Outdoor Sportsmanship for the entire year would amount to a personnel cost of $1600, or one-fifth of his or her total teaching time.

A materials cost estimate is simply the total of all teaching materials necessary to implement the activities. Without detailed lesson plans, the best method would be to provide a cost range based on estimated supplies needed for each instruction unit. A range estimate could be as great as from $40 to $4,000, so take it from there. It helps to itemize as much as possible with the alternatives indicated by instructional unit.

Writing Objectives

The best way to attain desired results is by writing specific, clearly written statements that identify the pupils involved, tell what they are expected to accomplish, and how their success will be determined. An example of a well written objective is:

> *The class will, at the end of two weeks, be able to demonstrate their understanding that laws are a vital part of wildlife management, through working together to write, distribute and interpret a "sportsman's survey" dealing with the reasons for following related wildlife laws.*

If necessary, all objectives could be written in this manner. Such writing may become a cumbersome chore when a group has to write program objectives for each goal, unit objectives for each study area and lesson objectives for each activity.

However, since this is an important part of the process, don't let the wordiness get so involved that it becomes a handicap rather than a directive.

There are a number of ways to establish objectives. We suggest using a content outline from each unit of study as the structure for determining objectives. Hence, the content dictates the objectives. The only short-coming here is the possibility of neglecting attitudinal objectives. This may be overcome, however, by including attitudes and ethics as part of the content outline. A well balanced content outline should include objectives that dictate development in attitudes and skills, as well as in knowledge.

Writing objectives which will fall into one of the three above types of learning depends on the action verb used. Figure 5 provides examples of action verbs in each category.

OBJECTIVES BASED ON	VERBS
KNOWLEDGE (Cognitive)	knows, understands, interprets, applies, demonstrates, distinguishes, writes, judges, proposes
ATTITUDES (Affective)	shows awareness, volunteers, participates, enjoys, appreciates, demonstrates commitment, recognizes the need
SKILLS (Psychomotor)	demonstrates skill in. . .operates a. . .sets up a . . .performs, repairs, builds, cleans, assembles, changes

FIGURE 5. Action Verbs for Writing Three Types of Learning Objectives

Planning Lessons

Writing and balancing objectives within a unit is all very well — in fact, objectives form the heart of the program. However, a major effort is then to plan activities in which the learner must engage to accomplish the stated objectives efficiently and effectively.

The standard format for writing an activity or lesson would include:

Title:	A catchy name suggesting the nature of the activity.
Time:	The amount of time required to complete the activity.
Purpose:	A brief description of reasons for doing the activity. This may also state explicitly the student objectives to be attained.
Materials:	A complete listing of everything needed to perform the activity.
Background Information:	A statement of what the learner should know up to this point. This may be in terms of post activity preparations. Hence, this step sets the stage for the activity.
Procedure:	A step-by-step breakdown of the procedure to follow. This represents the core of the activity.
Conclusion:	Usually put in terms of questions, this step ties together everything learned. This is the most important part because it relates the results of the activity to the objectives.

Although not every activity or lesson has to be written in this fashion, it serves well to keep such structure in mind. Activities designed to meet the three different types of learning objectives have unique characteristics and consequently, may not lend themselves to being written in the recommended format.

For example, activities designed to meet attitudinal objectives may involve a discussion approach. Using such techniques as "the Devil's advocate," contrived incidents, role playing, or simulation games, value and attitude comparisons can be brought about. Keep in mind that when dealing with values, no one person should assert his viewpoints as being correct. The best way to attain desirable outcomes is by allowing the individual to draw his/her own conclusions after you provide specific learning experiences. This approach allows for inconspicuous manipulation.

Attitudes are often regarded as "off limits" for teachers not only because they are difficult to "teach" but also because they are impossible to evaluate. The solution lies with assessing value development rather than evaluating — which implies a right or wrong. One assesses an attitude by presenting the student with the object of his attitude and observing his reaction. A graduated assessment scale can serve this purpose. Figure 6 is an example of an attitudinal assessment form.

Sample Objective: The student will feel positive about keeping a campsite clean

TEACHER ASSESSMENT
When asked to clean up after the class camping activity, the learner responds in the following way. . .

Ugh!		no feeling		Wow!
−2	−1	0	+1	+2

STUDENT SELF-ASSESSMENT
When you find litter in and around the campsite area, you will likely respond in the following way. . .

Ugh!		no feeling		Wow!
−2	−1	0	+1	+2

PARENT ASSESSMENT
When you are on a camping outing, your child usually responds to maintaining a clean campsite in the following way. . .

Ugh!		no feeling		Wow!
−2	−1	0	+1	+2

STUDENT ASSESSMENT
How do you feel about the campsite diagrammed below?

Ugh!		no feeling		Wow!
−2	−1	0	+1	+2

FIGURE 6. Evaluating Attitudes

Activities designed to develop skills and knowledge fall into the traditional educational approach. This does not mean that teachers do not have a responsibility to make the lessons interesting and fun. Basically, activities which hold greatest interest and achieve effective results are *student-centered*. The *process* and *inquiry* approach demands student involvement with the teacher serving as the facilitator rather than the lecturer. Every educator has techniques which work best for them in their special situation. Figure 7 summarizes a few teaching tips that may be helpful.

LESSON CONTENT

Objective-oriented in either the cognitive, affective or psychomotor areas

Relevant to real-life situations

Interesting, reflects student interest and needs to be structured in a logical understandable order

Concepts are technically accurate

Appropriate learning level to enhance student chances for success

Allows for some degree of freedom of choice

LESSON APPROACH

Student is the main focus of the activity

Participants are allowed to discover answers for themselves

Involvement in realistic problems is encouraged

Provide for open interaction of ideas to help clarify personal values

TEACHING METHOD

Teacher image represents positive attitudes — one which commands respect and emulation of the learner

A humanistic atmosphere exists where friendliness and trust prevail

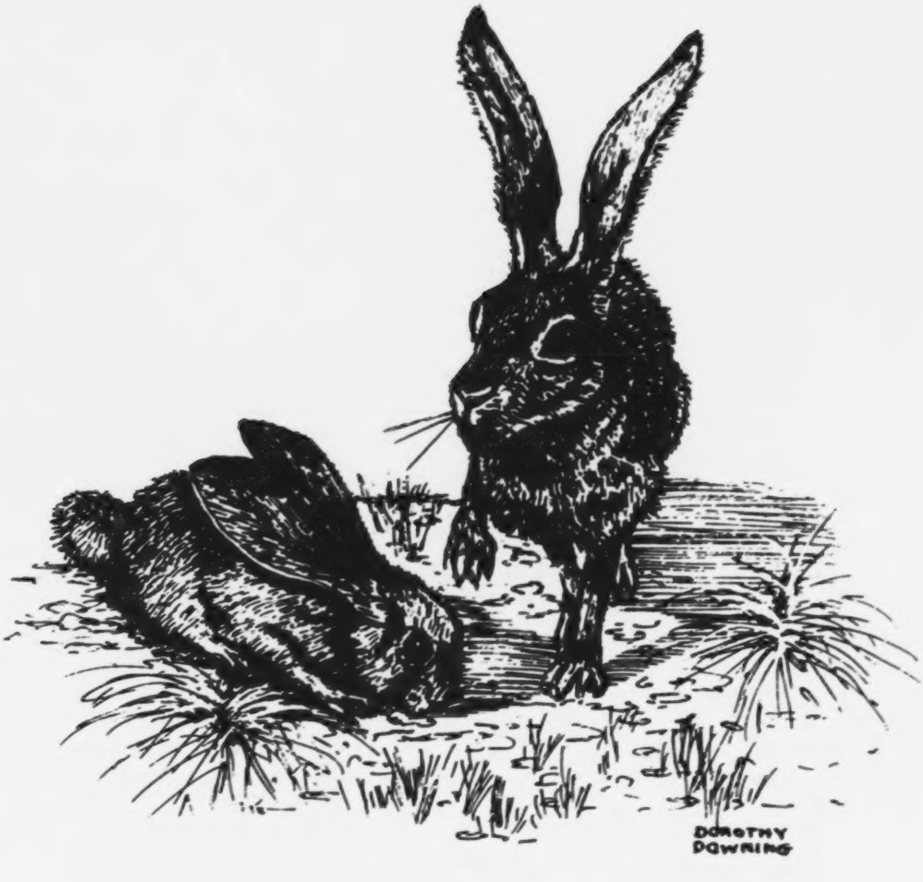
Teacher provides plenty of positive reinforcement

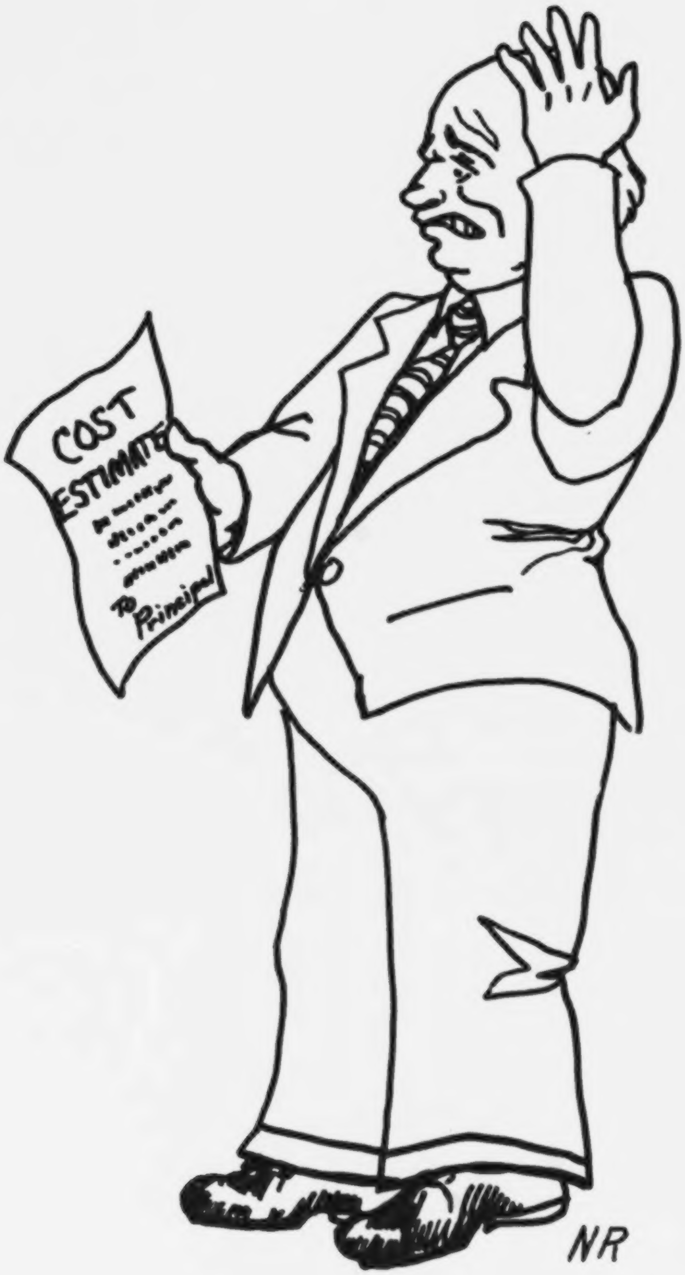
Individual concerns are met

Teacher role of facilitator rather than commander

Summarizes and ties together loose ends

FIGURE 7. Tips For Teaching Outdoor Sportsmanship


DOROTHY
DOWNING


COST
ESTIMATE
TO Principal
NR

Keep your program estimates realistic

CHAPTER 4

Implementing the program

Implementation, or putting the program into actual operation, is not the stage where the Curriculum Task Committee leaves off and where the principal takes over. There are simply too many vital responsibilities remaining for one person to handle. As a matter of fact, the Committee should start making provisions for program installation as soon as the curriculum is submitted and returned from the Board of Education with a financial commitment tagged to it.

Acquiring Resources

Money is the one limiting constraint which determines what you have to work with. Do not be surprised, however, if the program is approved, but with no funds committed to it. Don't be discouraged, alternatives are available. Rather than a question of what to purchase, it now becomes a question of what to beg, borrow, or raise money for.

The Curriculum Committee can offer considerable help by virtue of numbers in acquiring resources to build up a resource center — that is, a storehouse of teaching aids which can be shared by the instructors. Figure 8 gives an idea of items you may need. If the teacher can provide only one item that is personal property, then the activity becomes a demonstration. If five or more items are available, a class can share in a learn-by-doing activity. Hence, the program cost for a single class can range anywhere from $40 to $4,000, depending on how many students you can individually outfit with equipment.

Fund raising is usually regulated by school policy. Some activities may require a special city permit. Whatever the restrictions, it may be fun and worthwhile to get the students involved in such an effort. Some ideas for raising money include:

game dinners (check the laws)
candy sales
fairs
house and yard clean-ups
wildlife film shows
raffles
bake sales
flea markets
paper drives
marathon pledge events
auctions
car wash
slave days
bingo
recycling
"junk" reconditioning

Local volunteer help can be your greatest asset. Once sportsmen, local service clubs, businesses, and parents understand your program objectives, they are usually more than willing to help. A useful means of keeping track of what is available is filing pertinent information on index cards. Figure 9 suggests a format to use.

UNIT	DEMONSTRATION EQUIPMENT	
Hunting	Firearms: shotgun, rifle, BB gun (set) Ammunition Cleaning materials and equipment Reloader Game dressing equipment: knife, cord, saw, plastic bags. Targets	
Fishing	Rods Reels Tackle Lines Lures	Equipment for spin, bait and fly casting
Camping	Packs Tents Sleeping bags Cooking utensils Examples of proper clothing Camping tools: knife, axe, shovel, sharpening stone	
Ecology/ Wildlife Management	Vials Jars Soil and water testing kits Dip nets and seines Egg cartons Photos	

FIGURE 8. Program Resource Materials

Name:

Title:

Address: **Phone:**

Time to be reached:

Description of Resource:

____ Equipment loan
____ Guest Speaker
____ Consultant
____ Chaperone

FIGURE 9. Local Resource Index Card

Scheduling

There is rarely a more common excuse for not offering a new program than saying, "We are locked into our schedule and have no time." Confinement to present scheduling practices may depend on the Committee's ability to come up with viable alternatives. Basically what this takes is finding a time block where the same students can meet consistently for a given period of time. The possibilities usually lie within either working the program into the existing schedule, making school-day schedule modifications, or scheduling during free or open time. Put in more specific terms, the alternatives might be:

VARIABLE SCHEDULING

An example would be to divide the science, physical education or any other available class which normally meets five days a week, into three classes with two sessions devoted to Outdoor Sportsmanship.

You might justify this by adopting Outdoor Sportsmanship as part of the subject curriculum.

MODULAR SCHEDULING

Break the day's class length up into smaller time units, such as "mods" of 20 minutes instead of classes of 45 minutes. Classes can then be added which normally would not fit.

PLANNED ELECTIVE

Probably the most popular approach, this involves establishing a class during an open block of time. For example, instead of study hall, allow students to elect Outdoor Sportsmanship.

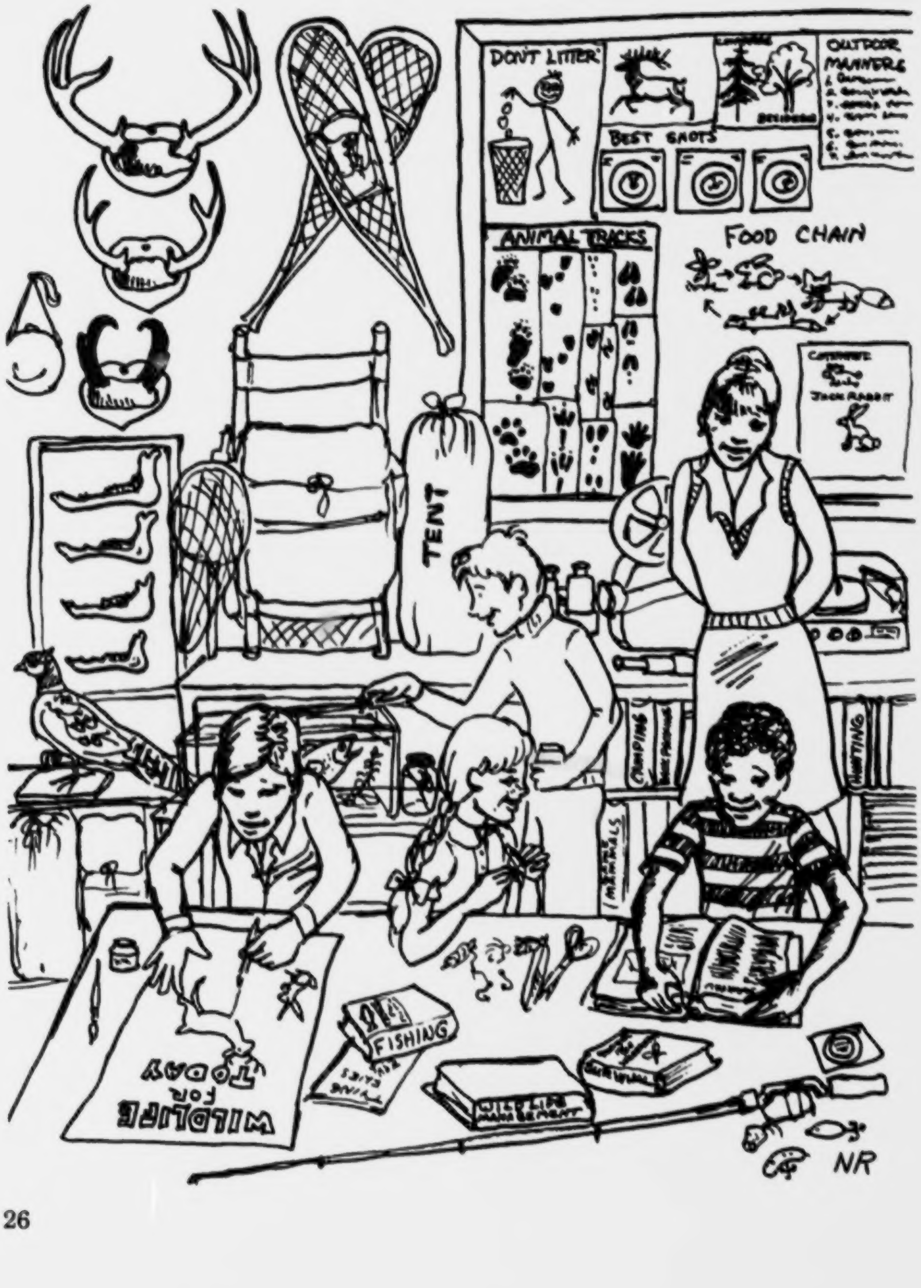
ADDING TO THE DAY

This involves holding the class before or after school. This may not be so popular with students, but with the nature of the course, you're sure to get the real enthusiasts, and from there, word will spread.

Establishing Facilities

The optimal facility for teaching Outdoor Sportsmanship would be a combination of a well-equipped science classroom, the out-of-doors, and a gymnasium. Because you might encounter difficulty in locating such a combination, you may have to compromise for a place (like the cafeteria when not in use) or settle for whatever you can get. Actually, it is often possible to improvise for most necessities. At any rate, the ideal facility should include:

Standard hardware, such as a blackboard, screen, overhead projector, movie and filmstrip projector
Water tap and sinks
Refrigerator
Display shelves and cases
Bulletin board space
Windows
Lockable storage room
Direct access to outdoors
Work or laboratory tables
Demonstration table
Standard desk and chairs


DON'T LITTER
BEST SHOTS
OUTDOOR MANNERS
ANIMAL TRACKS
FOOD CHAIN
JACK RABBIT
TENT
CAMPING
HUNTING
MAMMALS
FISHING
WILDLIFE FOR TODAY
WILDLIFE MANAGEMENT
SURVIVAL
NR

Of course, such things as a target range, a nature trail, an obstacle course, and campsite area is stretching the ideal, but these are facilities you should keep in mind for the future. Many activities can be practiced on the school lawn or parking lots. Remember, as a program proves its worth in terms of interest and results, a principal's priorities will likewise change in terms of what he "can" provide.

Budgeting and Purchasing

Program costs can usually be broken down into salary, textbooks, supplies and other expenses, such as transportation for field trips. As mentioned, the total program cost is quite variable, depending on the number of students and initial allocations. Your task is to determine a justifiable budget within initial fund limitations for planning priorities and building a rationale for possible program expansion.

BUDGETING. If you expected $4,000 and only received $40 for your program's operation, budgeting should depend on examining those objectives which are most important to meeting the philosophy and goals of the program. Indeed, this can be a painful operation of elimination, but it helps to have alternatives in mind before you start. Essentially, pick out activities necessary to reach those objectives and decide what can be done with limited resources. Here is where you may need to rely heavily on fund raising and volunteer help. Remember that the more interesting activities usually depend on active student participation — and participation *does not* always have to rely on elaborate equipment.

PURCHASING. The importance of carefully shopping around before purchasing any equipment cannot be overemphasized. Prices and quality can easily range as much as 70 percent in recreational equipment. So, in effect, you have to carefully weigh all the considerations before making decisions.

Purchasing supplies and materials as you go along is the hard way, but often you will not know exactly what is needed until you come to the activity. A good accounting system will assure knowledge of exactly where you are in terms of the original budget and what you can afford. Although the main office will probably maintain an account for you, Figure 10 gives a standard format to use to help you keep your own records straight.

DONATIONS. Sportsmen clubs and other outdoor organizations can often be approached successfully for donations of serviceable used equipment for your program. The success of such an approach will depend on you or others selling your program to them. Let the students help.

Identifying and Training Instructors

Finding an individual who possesses all the knowledge, skill and attitudes brought out in your curriculum will be extremely difficult. Such persons can be found, but most likely an inservice training course will be needed to build up the program. In many situations, a cooperative effort between an "ecology/biology" oriented teacher

School ________________________________

Program Title ________________________________

Account Number ________________________________

Total Appropriation ________________________________

Date Entered	Requisition No.	Purchase Order No.	Item	Company	Description	Amount	Unencumbered Encumbrances	Balance

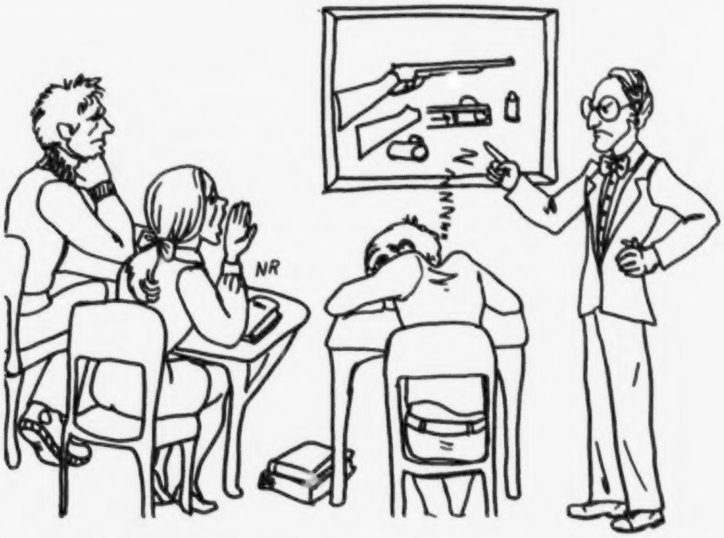
FIGURE 10. Budget Account Sheet

and an "outdoor education/recreation" oriented teacher would provide a most acceptable approach. A summary of the most desirable characteristics for an Outdoor Sportsmanship instructor would be as follows:

Enthusiastic and energetic — willing to devote personal time and effort
Competent in both subject matter and teaching methods
Emulates respect from students
Projects the excellent sportsman image
Certified hunter safety instructor
Vast experience and/or certification in outdoor sport instructorship
Certified in first aid

Inservice training can prove effective if time is spent carefully pre-planning the class. Many times an inservice session turns out unapplicable to the classroom situation. To avoid this, the first step involves writing objectives for the course. If at all possible, it proves beneficial to include the prospective participant's input in determining the workshop's purpose. Send out a "Workshop Suggestion Sheet" to those who are involved in the program or interested in helping.

In setting up an inservice program, you first must attain administrative support and request the necessary funds to acquire resources. One of the most valuable resources is consultant help. One or more highly qualified individuals can usually be obtained from similar successful programs at the public school or university level. Extreme caution should be used in selection of these people — the Outdoor Sportsmanship philosophy is truly unique, so ability in teaching proper attitudes is



What's your teaching creativity quotient?

just as important as competence in skill and knowledge areas. A worthwhile workshop will be well balanced, utilizing both consultants and internal expertise, to come up with results to fit your school's individual needs. Here are some inservice guidelines to keep in mind:

Design the program to train the teachers of Outdoor Sportsmanship
Build participant confidence in their teaching abilities
Provide for information on scheduling and facility considerations
Expose as many useful materials and aids as possible
Cover how to teach attitudes and values effectively. Include the process and inquiry approach.

Evaluating the Program

Evaluation is the step usually left out of program implementation but represents a vital step. Three distinct program components will serve as indicators as to whether the program should be continued, expanded, modified or terminated. They are: the program itself (i.e., the activities and resources used), the instructorship, and the students' progress.

Starting with the latter component, student tests are useless unless there is some means of determining whether growth has occurred as a result of the program. Therefore, in terms of skill, knowledge and attitude development, as outlined in the objectives, the value of the course can be proven if pre-tests are administered. This will also help you identify where extra efforts will be needed. Another advantage lies with being able to show some students right off that they do not know it all as is sometimes the case with outdoor sports.

Testing methods can include the traditional true/false, fill-ins, multiple choice and essay exams. Or, imagination can be put into such variations as performance tests, like walking through an obstacle course with a simulated firearm. The true test is what individuals do when they are on their own — so why not provide self-evaluation check sheets or parent check sheets.

An important part of student evaluation is providing incentives for succeeding. Design and distribute sportsmanship badges or certificates as a reward for successfully completing the course.

Students can evaluate the program as well. Sheer numbers may not be a reliable indicator when the choice is between "Sportsmanship" being offered by Mr. Neato and study hall with Mrs. Blah. Provide students with program evaluation forms. Ask what they liked and did not like. Encourage their suggestions and *use* their input for next year's plans. Ask them to rate specific activities used. Include a section on "Instructor Evaluation."

The total program soon develops a picture in the minds of the administrators. Comments from parents, students and community members are also indicators. Ask them for an evaluation if they have not been in to observe already. All this input should be documented and used to improve the program. That is the primary purpose of an evaluation.

A Glossary of Educational Terms Used in this Manual

ACTIVITY — A planned lesson usually involving the student's active participation.

BEHAVIORAL OBJECTIVE — A specific statement of the expected overt change in student behavior as a result of participation in a unit's learning activity.

CONTINUUM — An ordered or related sequence of course within the school curriculum. This may exist between courses within the same grade level (horizontal) or within the K-12 grade sequence (vertical).

CURRICULUM — A plan for providing sets of learning opportunities to achieve broad goals and related specific objectives.

GENERAL GOALS — The broader general outcomes desired from the school district's entire curricular program.

IMPLEMENTATION — The actual carrying out of the educational program.

INQUIRY APPROACH — Teaching by posing questions rather than lecturing and giving answers. This may involve problem solving by using "real-life" questions as motivating catalysts.

INSERVICE TRAINING — An ongoing process of educating staff members about aspects of program specifics.

INVESTIGATIONS — An activity usually involving active student participation in seeking the answers.

LESSON PLAN — A detailed description of the teaching strategy inclusive of objectives, materials, procedures, and evaluation methods.

NEEDS ASSESSMENT — A survey to determine the educational needs and desires of students and patrons.

PROCESS — The methodology used to plan, implement, evaluate and modify the program.

PROCESS APPROACH — A teaching technique involving students in "real-world" methods of finding answers. An example would be students designing and implementing an actual public survey.

PRODUCT — The anticipated student outcomes resulting from the program.

PROGRAM — The course of study put in terms of a curriculum which is designed to meet the students' needs as described by the goal and objective statements.

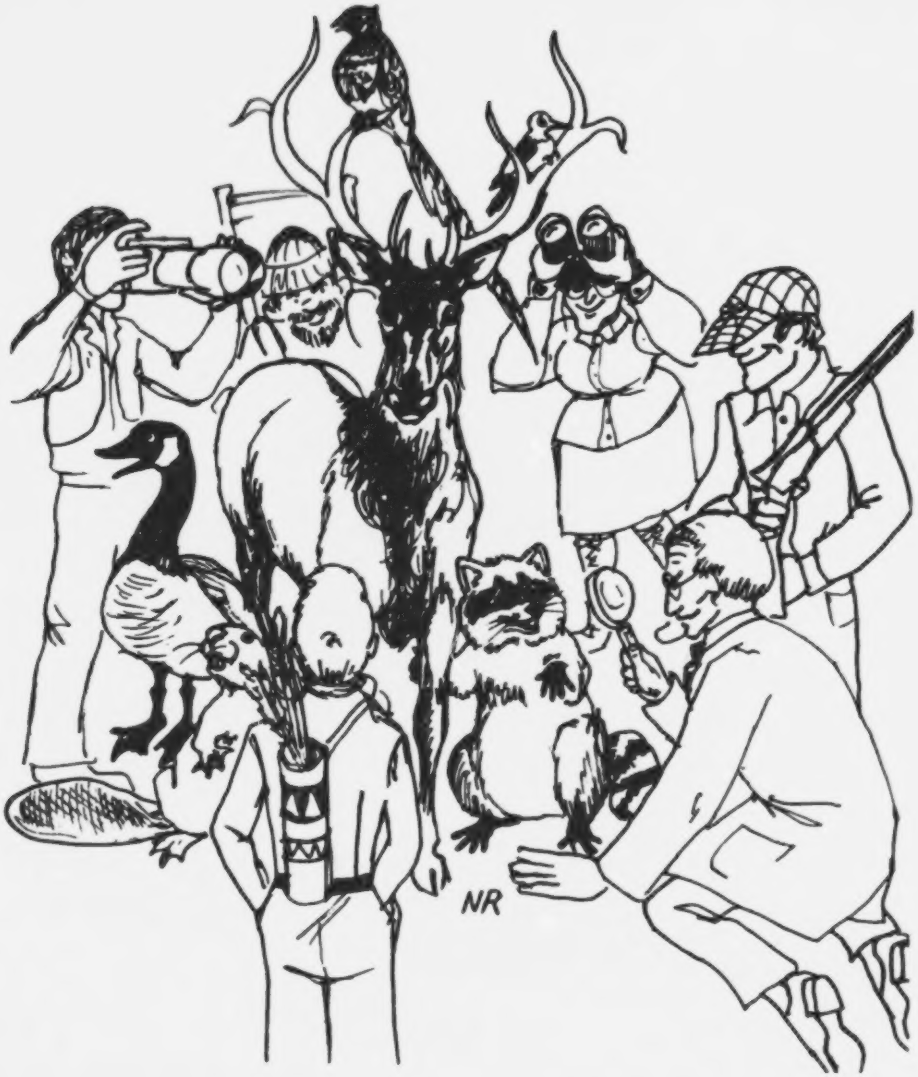
PROGRAM GOALS — Also known as subgoals, they are general statements of expected learner outcomes resulting from particular program efforts.

RATIONALE — A general statement identifying the reasons behind the program. This may also be called the purpose or philosophy.

RESOURCES — Any materials, person or agency which can either supplement the teacher's or student's background or be used as part of the lesson.

STUDENT-CENTERED LEARNING — Learning where the teacher serves as motivator, guide, and facilitator rather than the authoritarian lecturer. This involves active student participation in a variety of learning activities.

UNIT — A subject sub-division within the program or course as determined by different topics or areas of study.



Wildlife is for everyone!!!

CHAPTER 5

Concepts of Wildlife Management

Introduction

When developing respect for the out-of-doors, it is necessary for students to understand the basic principles concerning the interrelationships between the land, wildlife and man. Such knowledge is necessary for building a well informed citizenry to help resolve the many issue-centered controversies concerning natural resource management. Too often, however, we hear of "authoritative" teachers attacking resource management practices as being anti-conservation. Or worse yet, many instructors fail to cover conservation at all. The reason may be a lack of teacher preparation or background in ecology or wildlife management. This is understandable because of the many diverse courses required for teacher certification. For this reason, we are providing a Concept Supplement to help you with teaching Concepts of Wildlife Management.

Rarely can a teacher find such an accurate condensed version of an entire subject, such as wildlife management. For easy-to-follow reference, each concept is subdivided into understandings with given examples and illustrations. Read through this supplement carefully before you begin teaching. There may be a few ideas that even experts overlook.

The vocabulary following the concepts should be useful for you and your students. Your classes should know the meaning of common terms like ecology and environment, so often misused today.

We are greatly indebted to Mr. William R. Hernbrode of the Arizona Game and Fish Department, and the Arizona Department of Education for granting us permission to reprint these concepts, understandings, and vocabulary lists. Credit is also given to Mr. Ozz Warback, Michigan Department of Natural Resources and Mr. John Coultar, Wyoming Game and Fish Commission, for their fine cartoons and illustrations. **Previously copyrighted materials in this section are used with the authors' permission.**

Concepts of Wildlife Management

Basic Concept No. 1 — Wildlife is a Product of its Habitat

UNDERSTANDINGS

A. Environment determines the kind of wildlife in a community.

The physical and climatic features of a given area, its elevation, rainfall and topography, *plant communities, microclimates,* the chemical constituents of the soil, the historic activity of fire, man's use or abuse, glacial or volcanic action — all of these things and probably at least as many more, help to determine the species and numbers of wildlife in any *community.*

A comprehensive description of an environment — either in your state, or in any part of the world — will predict specific types of resident wildlife. For example, in an Arizona desert we may find a kit fox. In a similar Australian desert we find a dingo. The comparative *ecological niche* is filled by the same type of animal. *This* environment allows only its own kind to survive and prosper. *This* environment determines the kind of wildlife in *this* community.

B. Climate, altitude and moisture, interacting with land and water areas, produce communities called biomes. Each biome has a characteristic life.

The *biome* is the largest community unit which is convenient to recognize. In a given biome the *climax* vegetation is the same — in the grassland biome the climax vegetation is grass (perhaps varied species of grass in various areas of the biome, but grass is the dominant plant), in the chaparral biome brush is dominant and in the coniferous forest biome the pine tree is the dominant species. The dominant plant reflects the major aspect of climate and largely determines the habitat for wildlife.

C. Every habitat has a set carrying capacity.

A unit of habitat has precise limitations and boundaries just as a piece of farmland has its fenced boundaries and specific ability to produce.

The farm can produce only so many bushels of corn, bales of cotton or pounds of beef unless modified by fertilization, more water, mulching, etc. This potential remains fairly constant. So it is with a given unit of habitat — it can produce only so many horseflies, fence lizards, kingbirds, bluegills, foxes or deer. Habitat is the key to populations of any wildlife species and this has a carrying capacity, varying day to day and season to season, but with precise limitations at any particular time.

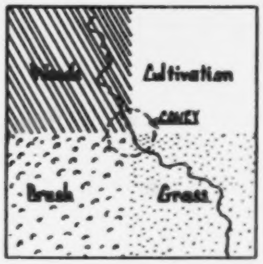
D. The five essentials of wildlife habitat are: food, water, cover, space, and the arrangement of these in relation to each other.

We all understand that wildlife needs food, water, and even to some extent, *cover* — but to realize that this cover means cover to hide in, cover to travel in, cover as shelter from the elements, cover for breeding, cover for *natal* activities, and cover for bedding, broadens this understanding considerably.

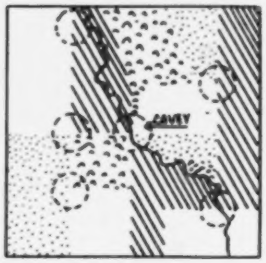
Another wildlife requirement is space, or elbow room just as for you and me. A coyote will make the boundaries of this territory just as we fence our property. A cardinal will vigorously evict another cardinal infringing on his kingdom. The "territorial imperative" is an important understanding when dealing with wildlife.

The thought that food, water, cover and space must be properly distance-related to each other is a new realization to most of us. When the water is too far from the food and the bedding cover is too far from the escape cover — then the habitat is not suitable for wildlife. Each species has its own measurement of distance. What might be too far for a porcupine or a squirrel might not be too distant for a deer or mourning dove. If, in our community, we moved all bathrooms to the farthest north edge of town, all bedrooms to the extreme south, all grocery stores to the next county to the east, and the water supply 10 miles west, how many people could live here? This is how it works for wildlife as well.

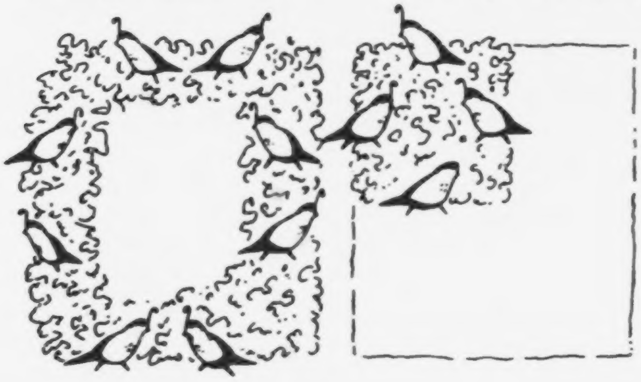
Look carefully at the diagrams; they illustrate this point.



Poor edge-effect (1 covey)



Good edge-effect (6 coveys)



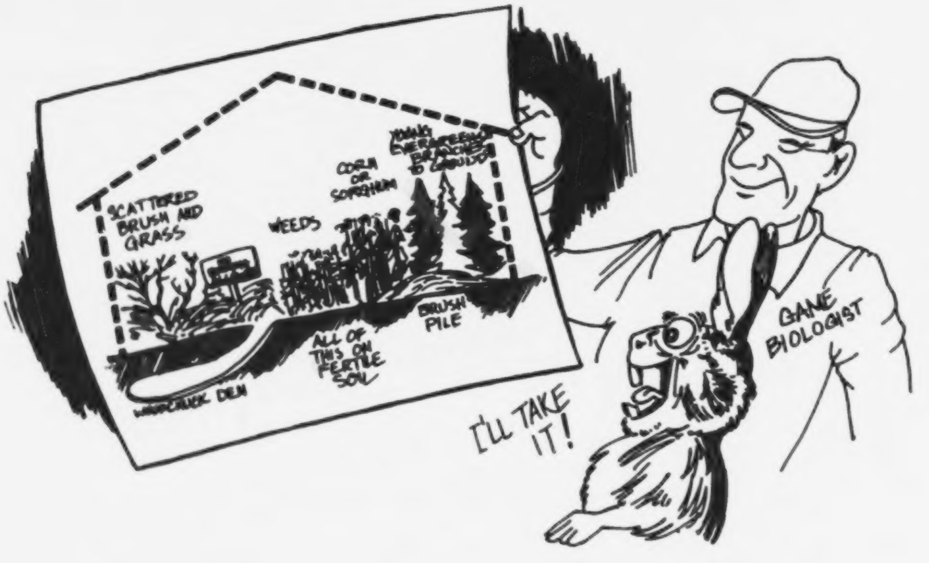
Distribution of food and cover is important. Ten acres of cover surrounding a field is more effective than a ten-acre square in one corner.

E. **In any environment, one component like water, air, light or food may become a limiting factor. When these, and other resources are in short supply, or in excess to the tolerances of an organism, they are said to be "limiting factors."**

When a lake is muddied by erosion on the surrounding watershed, light no longer penetrates the water to the former depths. Without this light the microscopic plants *(primary producers)* cannot produce the energy they must pass to the aquatic insect, to the minnow, to the bass. And so, light may indirectly be limiting but the real limiting factor to the bass population would be the food supply.

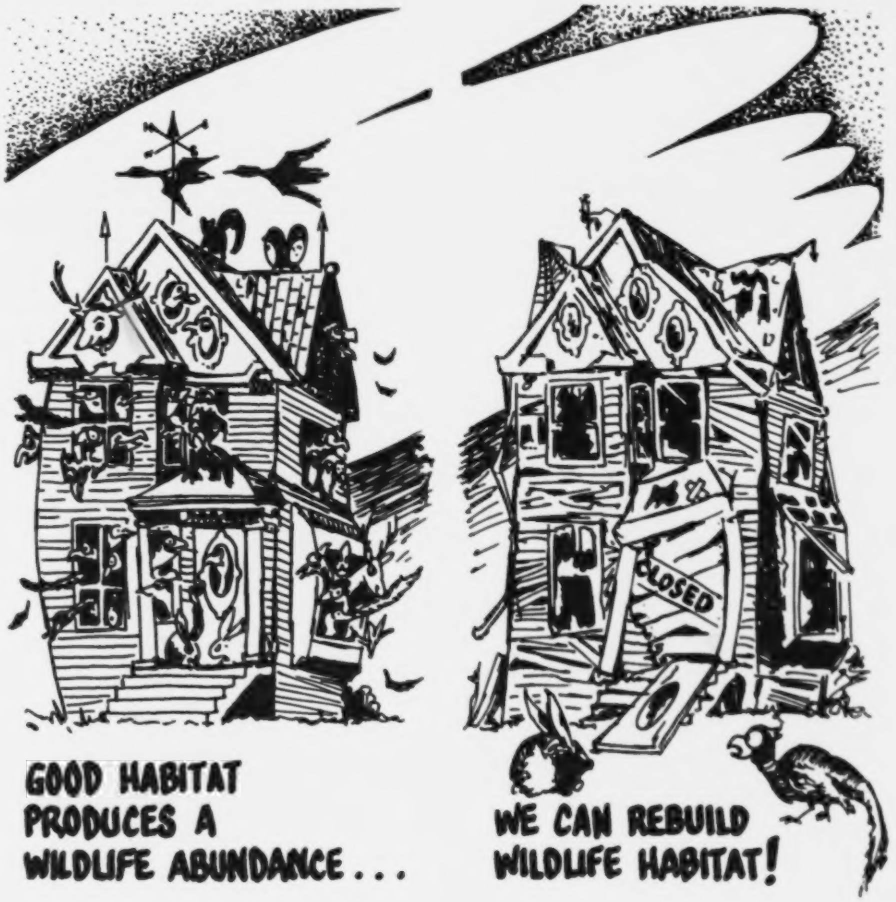
F. **Wildlife resources are limited in quantity, quality and distribution.**

Wildlife population levels are determined by quality of habitat. Some habitats have a higher "carrying capacity" than others and can support a higher density of animals of a species than other habitats. The extent of the habitat determines the distribution and "total numbers" of animal. For example: more pronghorn antelope live in Wyoming than in Arizona and, consequently a larger total pronghorn population exists even though "density" (pronghorn per square mile) might be as high or higher in Arizona.


SCATTERED BRUSH AND GRASS
WEEDS
CORN OR SORGHUM
YOUNG EVERGREENS BRANCHES TO GROUND
BRUSH PILE
ALL OF THIS ON FERTILE SOIL
WOODCHUCK DEN
I'LL TAKE IT!
GAME BIOLOGIST

G. **Regulations, although desirable for good wildlife, cannot substitute for good habitat, or save a species whose habitat has been depleted or destroyed.**

There is no substitute for good habitat where wildlife is concerned. Laws and regulations protecting wildlife from excessive use or abuse are important and desirable but will not produce wildlife. (The reduction or loss of a population occurs more quickly and completely through habitat destruction than by any combination of hunting, trapping or even deliberate malicious vandalism.) The species can only be preserved and made to prosper by preservation of the habitat and improvement of this habitat.


CLOSED
GOOD HABITAT PRODUCES A WILDLIFE ABUNDANCE . . .
WE CAN REBUILD WILDLIFE HABITAT!

Basic Concept No. 2 — Wildlife Species Are Interdependent With One Another and with Their Environments

UNDERSTANDINGS

A. Living things interchange energy and matter with the environment and with each other.

The essence of life begins with light from the sun; and it is continued by the transfer of this energy from sun to plant to animal.

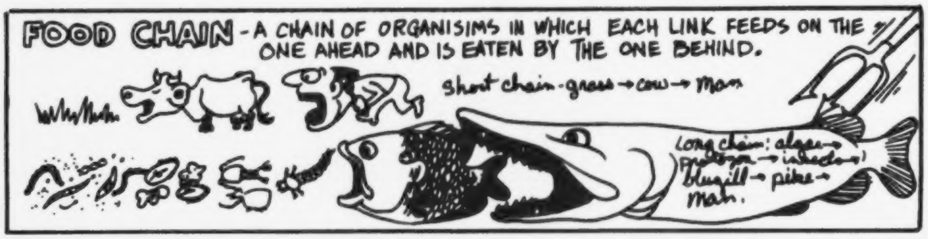
This connecting of energy organism to organism is called a "food chain." Each organism has its own specific food chain which may overlap that of other organisms. The interlocking pattern of these food chains is called the "food web" or the "web of life." Through this fantastically complex web flows the energy and matter, circulating from organism to organism to environment.

B. The comprehension of food chains and food webs is basic to understanding wildlife conservation and management.

An elementary knowledge of wildlife is that animals must eat, and that their food must be of a proper quality and quantity. Each living thing, from tiny *microorganism* to Boy Scout, has a specific food chain to supply this need.

The food chain illustrated here shows only *one* food of the fisherman. Remove the fisherman from the scene and it becomes the food chain of the bass. Remove the bass and what remains is the food chain of the bluegill.

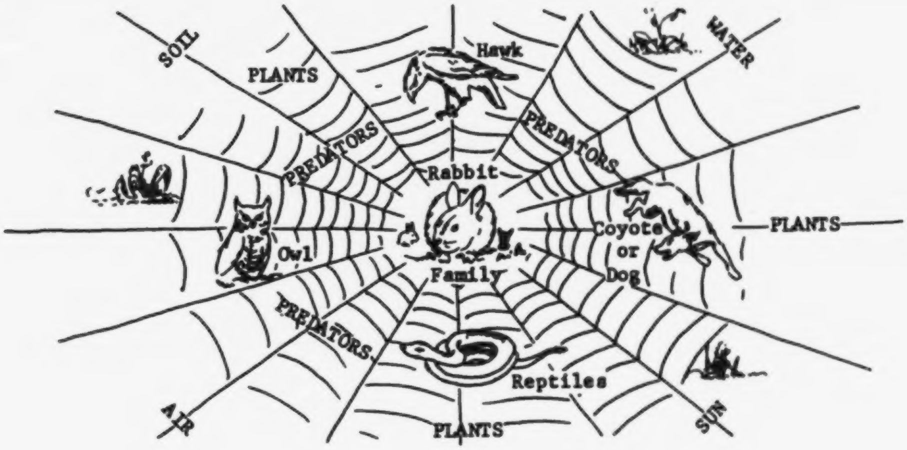
The complexities and interaction of food chains must be understood if we are to manage and conserve wildlife. For example: a refuge cannot benefit a species unless it contains the food chain of that species.


FOOD CHAIN - A CHAIN OF ORGANISIMS IN WHICH EACH LINK FEEDS ON THE ONE AHEAD AND IS EATEN BY THE ONE BEHIND.
Short chain - grass → cow → man
Long chain: algae → protozoa → insects → bluegill → pike → man.

C. Living things are interrelated to each other as demonstrated by a food web of a given community.

We have learned that each living thing has a food chain. Now we learn that these food chains overlap and interconnect — that the cottontail is not only eaten by the coyote but by the owl, the snake, the bobcat, the hawk and others. The flying insect may be part of a food chain for a skink or a skunk, a snake or a raccoon, a trout or a sparrow hawk. Grass may be eaten by a rodent, a bird, or a buffalo.

WEB OF LIFE



D. All wildlife have individual, specific living requirements yet are interdependent with their environments.

Each species of wildlife — earthworm or eagle, chipmunk, salamander, or elk, has specific needs, specific living requirements. The soil must have a specific moisture content for the earthworm; specific conditions must exist for the eagle to build her nest; ground cover must be available for the chipmunk's scurryings; a transitional availability, from water to land and return, are necessary to the salamander; and the proud elk loves a muddy wallow during fly time. Unless their specific needs are satisfied, these creatures would not be present. These represent only some of their interaction with their environment.

In turn, the earthworm may help to *aerate* the soil of the mountain meadow; the elk's droppings stimulate the growth of grasses, grasses which hold moisture in the soil — and supply food for the elk and other wildlife. Grass seeds provide food for rodents or a wild turkey which an eagle may eat. So, the earthworm affects the elk and the elk the eagle. All nature shows this fascinating pattern.

E. Certain natural processes, generally occurring as cycles, (hydrogen, nitrogen, carbon, water) influence the interrelationships of living things and have an effect on the physical world.

Both plants and deer receive water from, and lose water to, the atmosphere. A deer may obtain some needed moisture from his plant food and his body discharges of moisture may be used by another plant.

These interrelationships between a deer and its food are only elements in the natural water cycle, and this is just one relationship affected by one natural process or cycle. At another stage of the cycle, water may erode a hillside, uproot and destroy plants and even drown a deer.

F. Living things respond to their environment.

All living things respond in a positive or negative way to their environments. When an environment shows increased value (in reference to this single living thing) the organism responds by increasing growth, life span, health, or most commonly, by increasing reproduction. In a deteriorating environment the organism shows stress, starvation, and a reduced reproductive potential.

On a good *browse* range a mature mule deer doe will annually produce two fawns, and these fawns will have a good chance of survival. On poor, or overgrazed range, this doe may only give birth to a single fawn whose chances of reaching maturity are slim.

Food is only a part of this environment and a parallel reaction will be seen when other parts of the environment are involved. This environmental quality may be seasonal; thus a drought, hard winter or range fire may produce a response in health, reproduction etc.

G. Wildlife resources are vulnerable to depletion in quantity and quality. They vary in susceptibility to this depletion.

Some wildlife species are more easily damaged than others. Species with very specific food needs can be decimated by the loss of, or damage to a food supply. Fish-eating birds are an example: When water is polluted fish die and waterbirds starve or migrate. If fish have too much pesticide deposited in their fatty tissues, the bird's eggs no longer hatch. Either way the bird population is reduced.

Coyotes, for an opposite example, are opportunists. They can and will eat carrion, rodents, deer, insects or fruit — depending on availability. And if all else fails, they will raid your garbage pail or eat your cat. A coyote population is not very susceptible to depletion.

H. Species and environmental factors interact to keep animal populations in balance with the community.

Some species of wildlife compete with other species for food, space or other needs. Some species of wildlife are neutral in effect upon each other, still others are

50

mutually beneficial, or one may benefit another without harm or help to itself. Some species are *parasitic* upon another, or *predaceous*. (The *predator* kills for food — the parasite lives upon the host usually without killing.) Each of these variations has important effects upon one or both of the species.

A javelina may compete with a coyote for cactus fruits, and a badger may dig for the same rodents that the bobcat stalks nightly.

A zebra-tailed lizard and a Gila monster may have a completely neutral relationship.

A smart coyote may follow the lumbering badger and watch his laborious digging for rodents — and catch those rodents that escape the badger's grasp. So, the coyote benefits from the badger's efforts.

Environmental factors like water, light, moisture, and temperature working together, also affect and control wildlife in complex ways.

The spadefoot toad reappears for his nuptial ceremonies and reproduces only with the summer rains.

Temperature controls the hatching of the brook trout or leopard frog egg — temperature and moisture working together create the humidity necessary for a quail egg to hatch and the lengthening hours of daylight trigger the nesting of the wild turkey. This endless chain of reactions to other species and to environmental factors constitutes an endless and fascinating study.

I. The addition or removal of a species from the community may create harmful or beneficial reactions in the environment.

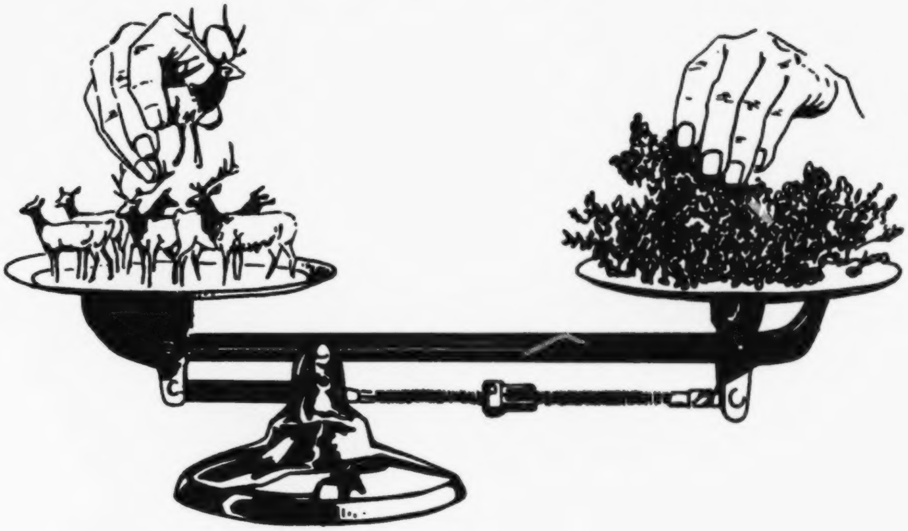
Quitobaquito is a desert stock tank fed by a spring on the Organ Pipe Cactus National Monument in Arizona. This small body of water contains a remnant population of tiny one-inch fish called the desert pupfish. Recently, someone introduced another small fish, the western goldenshiner, to these waters. The shiner is a larger, more active competitor for food, cover and space, and may very well supplant the endangered pupfish by simply crowding it out.

Quitobaquito had to be drained and treated to remove the threatening shiners to preserve the endangered species. Here the addition of a species endangered the native species.

Some Arizona lakes have excellent plankton growth, a good *aquatic* insect life; but the next step up the food chain (minnows), was inadequate. There were no small native fishes to fill this niche in the food chain.

Fisheries biologists (after careful investigation and evaluation) introduced the threadfin shad to these lakes. The shad is a small silvery fish which is very prolific and seldom gets more than four or five inches in length. This introduction greatly improved the habitat for largemouth black bass, a species much desired by fishermen. Bass, with this addition to their food chain, increased growth tremendously. A year-old bass once weighed about three-quarters of a pound. Now, yearling bass nearly double that weight. The addition of a species aided the native fish.

So we see both plus and minus figures when we introduce an exotic organism into the environment.



Basic Concept No. 3 — Wildlife Populations and Their Environments Are Not Static But Are In Constant Change.

UNDERSTANDINGS

A. **Succession is the gradual and continuous replacement of one kind of plant or animal by another, and is characterized by gradual changes in species composition.**

When plant succession begins in a burned-over western U.S. forest, plant replaces plant; grasses and weeds to brush or chaparral, to aspen, to pine or Douglas fir. As this plant succession occurs there is a parallel succession of animal life — mice and gophers, to deer, to squirrel. Insects and birds are included in the pattern — grasshoppers and horned larks in the grass; certain beetles and towhees and bush tits in the chaparral; tent caterpillers and downey woodpeckers in the aspens and bark beetles and stellar's jays in the forest.

There are simple examples — the presence of each of these animals helps establish a habitat for some predatory species which depends upon them, in part, for its livelihood.

B. **Changing environment affects living things and the more specialized an organism becomes, the less adaptable it is and the less able to survive this change.**

Environmental changes, from whatever cause, have dramatic effects upon all living things. Some are affected more severely than others.

For example, overgrazing by livestock in the late 1800s changed the habitat of the masked bobwhite so greatly that this bird became extinct in Arizona. The change in environment occurred over a very few years and this bird could not adapt so quickly. Gambel and scaled quail were obviously more tolerant of these changes caused by overgrazing and continued to exist or even prosper. When the changes are gradual, species adapt or evolve in adjustment. Those that cannot become extinct. So, we see that environmental changes are not all detrimental. It would depend, in this case, on whether you were a masked bobwhite or a Gambel's quail.

C. **Given sufficient natural resources, a population will continue to increase in size unless some limiting factor is imposed.**

If a pair of quail, in excellent habitat, raise a dozen young a year, it would not be long until we were knee-deep in quail. But we are not knee-deep in quail because other factors than the supply of food, water, cover, and space are also involved. Accidents, disease, and predation keep this quail population from bursting its seams. The excellence of the habitat and the reproductive potential of the birds tend to increase the population — but the effects of accidents, disease, predation (hunting is part of this predation) exerts a downward pull and prevents the population from reaching its theoretical maximum. Many species reach a "saturation point" where social strife sets the ceiling they will tolerate. So there is a social limit to density. But it is important to realize that no combination of factors ever occurs which enables wildlife actually to reach this maximum.

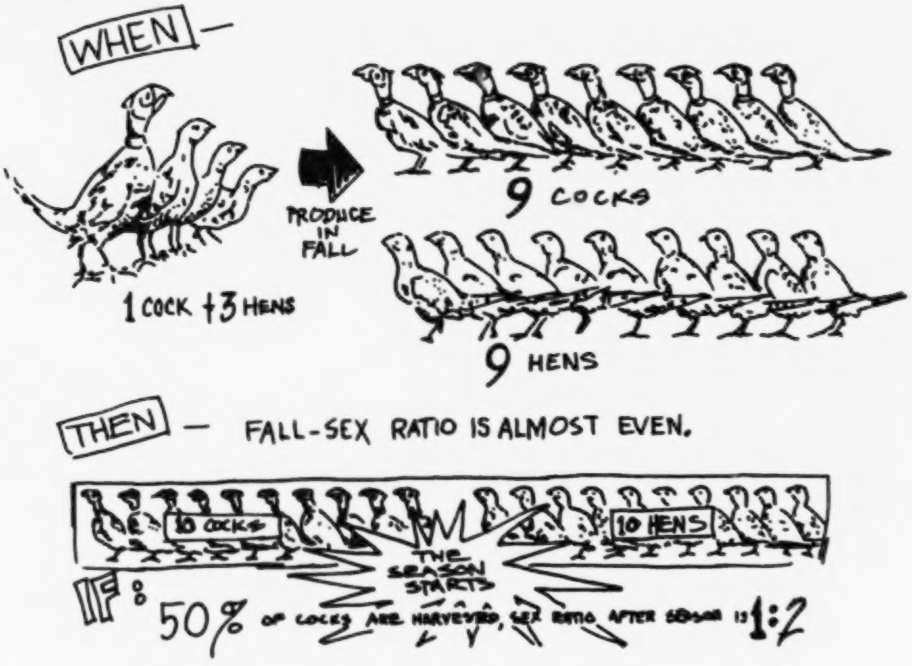
D. **Living things tend to produce more of themselves than their habitat can support.**

The reproductive capacity of wildlife is astonishing to the uninitiated. The fact that one pair of quail, if entirely unmolested, in an "ideal" environment, could become 1,024 quail in three years — or that a pair of pronghorn antelope, in spite of breeding once a year and averaging only two fawns, would increase to 10 antelope by the end of the third year is startling. A mature female black bass may lay over 20,000 eggs in one year. A whitewinged dove may lay only two eggs per nesting but may nest three times in a summer breeding period. The reproductive potential of many insects is legendary.

So we see that the potential production of organisms would soon inundate the habitat — the lake would overflow with bass and the desert would be crawling with quail. In the great scheme of things, this mass production is planned to offset the numerous factors that tend to repress increase.

Creatures which are heavily preyed upon, like the cottontail rabbit, are more prolific than others. All prey species have high breeding potentials; this presupposes some natural means to dispose of the surplus.

Factors of predation, starvation, disease, accident, poor quality food, habitat destruction, and the encroachment of civilization all subtract a heavy toll from this production. The need of an animal to control a given amount of territory, to "own" a homesite, can limit a population as well. If and when one or more of these factors is partially nullified, a population increase can be expected, to be followed sooner or later by a larger mortality which corrects the balance once more.


WHEN —
1 COCK + 3 HENS
PRODUCE IN FALL
9 COCKS
9 HENS
THEN — FALL-SEX RATIO IS ALMOST EVEN.
10 COCKS
10 HENS
THE SEASON STARTS
IF: 50% OF COCKS ARE HARVESTED, SEX RATIO AFTER SEASON IS 1:2

Basic Concept No. 4 — Wildlife Is A Renewable Resource

UNDERSTANDINGS

A. Wildlife is considered to be a public resource.

Wildlife, by law, is property of the "state," which, of course, means that it belongs to the people. This originates with the Constitution and "States' Rights" where states were given jurisdiction over wildlife, except for migratory species such as waterfowl which are regulated by a treaty act with Canada and Mexico. Even here the state has control within boundaries set up by the treaty.

B. Wildlife is not immortal and cannot be stockpiled.

Most species have short life spans and tremendous potential to reproduce. A rule of thumb could be, "the larger the animal the longer the life span and the smaller the reproduction capacity." In smaller species there is an annual cycle of increase and loss which we call "the annual turnover." In birds, like quail, for example, this population will increase 250 percent in the summer, and decrease to the starting numbers again by the following spring. This is the normal cycle of the population: In January — 300 birds, by July — 1,000 birds, and by the following January — 300 birds again. Thus, we see that a high production rate always indicates high mortality or turnover.

C. Not all resources are equally abundant.

The wildlife resource, as we have already learned, is based upon the available habitat and its quality *for that* specific species. Thus, while we may have high populations of grasshoppers, we do not necessarily have high populations of quail or javelina.

D. Natural resources can be managed to extend their value.

Perhaps the best known example of this is the harvesting of timber on a well-managed forest. Timber is cut and made into lumber, and new trees are replanted or allowed to reseed into the area for some future harvest.

Many people do not recognize that this is equally true of the wildlife resource. A certain part of wildlife populations can be annually harvested without damage to the resource. A given unit of land that is control harvested will produce several times as much wildlife as an unharvested area over a period of years. (Nature abhors a vacuum and when one animal is removed it leaves room for another to take its place.)

Proper management of their resource can produce wildlife for use this year, and the next and the next, without dipping into the "seed stock."

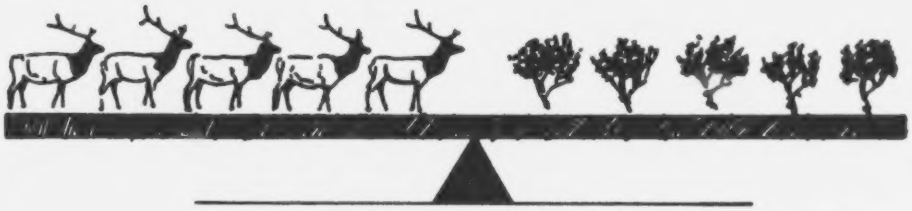
E. **Harvesting an annual surplus of wildlife can be an important part of management.**

Large herbivores (deer, elk, etc.) have the capacity to destroy their habitat when populations increase beyond the carrying capacity of the range. Man, having removed the grizzly, the wolf, and reduced lion numbers, must now take the place of these predators and remove an annual surplus to prevent this destruction. Animal numbers can increase rapidly on a good habitat, but the habitat, once damaged, is slow to recover.

Small game, such as quail and rabbits, have a tremendous reproductive potential — and an equally large annual mortality. Man can well afford to harvest a share of this annual mortality, rather than letting disease, starvation, accident, etc., take their toll. Again, man inserts himself into the scheme of things and takes a share, which in this case would have been lost anyway. Wildlife cannot be stockpiled.

It is necessary to harvest big game to protect habitat, but it is also desirable because of man's benefit from the harvest. With small game the harvest is not necessary, but is very desirable and a valuable resource. And equally important, monies from hunting fees pay the game management and protection cost for all species — even the unhunted.

Hunting does no more than utilize a part of the annual fall surplus — a surplus that will not survive the winter, whether hunted or not.



F. **Only non-consumptive use of our wildlife resource is advocated by some groups.**

There are people who object to the killing of any animal. Their objections are entirely philosophic. They feel that, because man no longer needs to hunt for food, he should not hunt. This philosophy objects to the harvest of wildlife for "sport" or recreation.

Some of these groups accept harvest as a necessity of good wildlife conservation, but feel that the harvest must be by professional wildlife managers, not by hunters.

G. Public agencies like your state's game and fish department and the U.S. Fish and Wildlife Service are charged with the responsibility of wisely managing the wildlife resource.

Usually we consider that there are five basic steps to this wildlife management. These are: Inventory; an understanding of what species are in the unit being considered and why they are there (habitat evaluation). Census; some determination of numbers in the population (how many eagles are there?). A yield determination; how much is produced, what is the productive capacity of the area for each species? A diagnosis or interpretation of these factors — really a careful evaluation of the resource and its potential. And lastly, some controls and manipulation of the resource. This could be a total protection for an endangered species, very limited harvest of a small population, or an intensive reduction of a herd that threatens its own habitat. This control would also include activities to improve habitat for species. These are the basics, but wildlife management is much more complex than these simple statements.

H. Wildlife is a resource that largely pays for its own management via the fees obtained from its harvest.

In most states, all monies to manage, protect, conserve, or benefit wildlife, come directly from the hunter and fisherman. His licenses, his sporting goods taxes, and the fines he pays when he breaks the law, pay for research into new management techniques, protection of all species (not just the huntable or fishable), preservation, reclamation, and improvement of habitat, wildlife conservation education, reintroduction of species, in short, all wildlife work done by the agency which by law is charged with these duties.

Basic Concept No. 5 — Man Is, and Has Been, An Important Factor Affecting Plant and Animal Succession and Environmental Processes.

UNDERSTANDINGS

A. Increasing human populations and technologies require space and activities often detrimental to wildlife.

We are all familiar with the predictions for human populations and have seen and felt the dramatic increases. But most of us are not cognizant of the tremendous effect this has on wildlife, through the destruction, alteration or division of wildlife habitat.

The greatest threat to wildlife worldwide is man's activity in development. When a city expands, when a highway is built, when forests are logged, when livestock is grazed, when crops replace virgin land, wildlife is vitally affected.

A freeway only occupies about 24 acres of wildlife habitat per mile — but more important than the acreage is the division of the piece of land. This may separate the water from the food or shelter for a species — and so eliminate the entire square mile as useable habitat. Look back at the diagram in Concept No. 1D. Imagine a highway superimposed diagonally across the map. What would this do to the quail in the area?

Impose other activities on the diagram — the results are the same — wildlife habitat is eliminated.

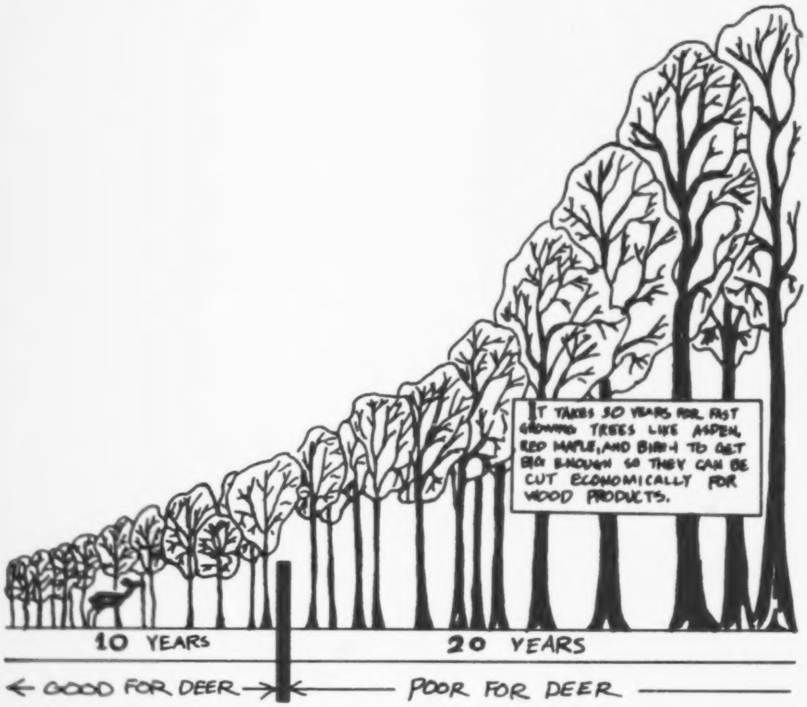
Much of what modern man does in his struggle for "progress" is detrimental to wildlife. But, if man cares enough, some compensation can be made, through some mitigation of this habitat damage.

This we must do — or wildlife will continue to lose.

B. The use made of one resource will affect another adversely or beneficially.

The use of one resource may have important effects upon another. Effects can range from highly beneficial to seriously detrimental.

When a forest is logged, an understory of grass and forbs, brushy plants and young trees revegetate the opened areas. This change of habitat may be highly beneficial to deer (on a short-term basis). But if we look at the needs of woodpeckers or squirrels, the habitat for them has been damaged if not eliminated by this activity. This is only one example, but it illustrates conflicting effects of man's manipulation of the earth.


IT TAKES 30 YEARS FOR FAST GROWING TREES LIKE ASPEN, RED MAPLE, AND BIRCH TO GET BIG ENOUGH SO THEY CAN BE CUT ECONOMICALLY FOR WOOD PRODUCTS.
10 YEARS
20 YEARS
← GOOD FOR DEER →
← POOR FOR DEER

C. Wildlife populations are decreased by many of man's activities.

Almost everything man does has an effect upon some species of wildlife. The effect may be beneficial or detrimental, but too often it is the latter. Some of this damage to wildlife is because man does not care, but most of it is unthinking and unknowing.

The important thing to understand is that not all of this loss is necessary. Damages can be mitigated and alternatives less harmful to wildlife can be taken.

We abuse our land in many ways: strip and open-pit mining, overgrazing, careless road construction, poor farming techniques, misplaced housing projects — the list is endless. But it is unnecessary to damage our environment to this degree.

When a highway is built, it is commonly built the shortest, most economical way. Many times this unnecessarily destroys wildlife habitat. There is more than the shortness of the route and the economy of the moment to be considered. Today's savings can be tomorrow's losses.

When a man farms, he must protect his crop against depredation from insects, so he applies pesticides which damage nearly every animal organism they contact. Different techniques of farming can alleviate this problem and lessen the need for pesticides. Other chemicals can be developed that are less dangerous to the environment.

In Europe, strip mining is done — but with careful attention to returning the land to its ability to produce other values when the mining is completed. Overgrazing can be prevented by careful balance of livestock (and wildlife) numbers against the productivity of the range. Roads and highways can be designed to have a less disruptive effect upon the countryside. Poor farming techniques can be improved and subdivisions can be placed on lesser value lands. Some of these things will cost you and me a little more money — but will give us and our grandchildren and wildlife a better environment. We cannot afford *not* to pay these increased costs.

D. Depletion of a wildlife resource can be slowed or halted by protecting habitat, by providing new habitat, or by improving existing habitat. The development and adoption of alternatives in habitat use is also most important.

The basic keys to greater wildlife numbers are protecting habitat, improving existing habitat or creating new habitat. Such improvement might be reseeding, developing new waters, reducing certain plant species that are competitive with better wildlife food species, etc.

Other forms of management might include reduction of competing species (feral burros or livestock), control of disease, predator control, controlled harvest, establishment of refuges or resting areas, and the changing of land patterns.

An alternative to a total clearing project or the re-channeling of a waterway; an alternative to a freeway; an alternative to a certain pesticide, herbicide or fertilizer — these considerations must be made, and they will aid wildlife greatly.

E. **Man has at his disposal tools and knowledge to change his environment to better or for worse. Wildlife is an end product of his wise use of land and water resources.**

While there is still much we do not know about our natural environment and the interrelationships within it, there is much we do understand. We know and understand enough to be able to substantially reduce the habitat and environmental destruction we have already done. And we know enough to prevent or mitigate much future damage.

Man produced the tools of destruction: the bulldozer, the dragline, the dredge; and these same tools can be the tools of reclamation and repair. Tools that can drain a lake or level a mountain, can create a lake, or terrace a hillside to prevent erosion.

The combination of his increasing knowledge and his capacity to manipulate the world around him allows him to change his environment almost as he pleases. He must accept the risk of such activities and must recognize that these actions must be limited and controlled by the possible consequence. Every act of man which can react upon his environment must be evaluated and accepted or rejected only after a careful consideration of the consequences.

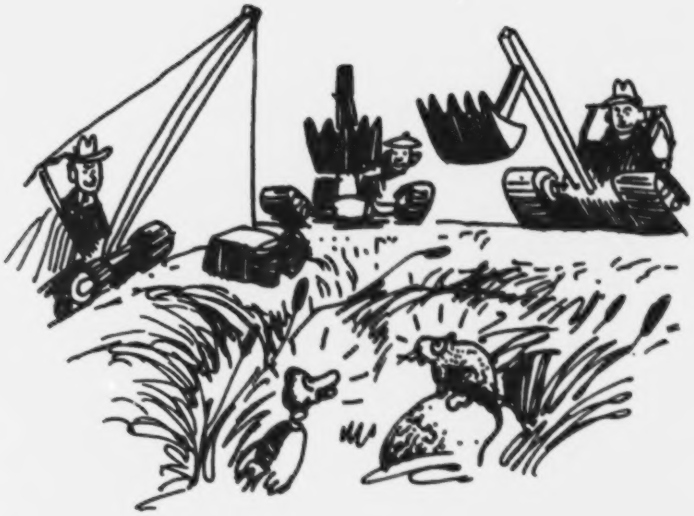
F. **Wildlife has many values to man and is a valuable resource in the United States. Man cannot live without wildlife.**

Man's relationships with wildlife have changed over the past hundred years, but not his dependency upon their values. A deer or a beaver was once an important addition to his way of life; now it contributes food and fiber as a secondary importance. Recreation has become the major reason for hunting. But man's dependency upon wildlife has not changed. He needs the spider's control of insects, the pollinating efforts of butterflies, the rodent control activity of the bullsnake, the seed scattering of birds and perhaps even the rooting of the javelina, distributing the earth and allowing percolation of scarce rain and assisting the generation of seeds. The earthworm, the dung beetle, the woodpecker and the carpenter ant all play an important part in man's environment.

G. **Adequate wildlife conservation practices depend on a knowledge and appreciation of natural laws and the application of knowledge from many disciplines. These practices also require long-range planning.**

To adequately manage wildlife, one must have an intimate knowledge of the animal's life history. The manager should understand population dynamics, ecology of the area, and relationships between species. It's also important to know the plant life and its productivity and potential. This knowledge comes from study in many disciplines and from practical experience in the field.

All of this and much more, combined with careful, long-range planning is needed to produce proper and careful management of a resource.



H. Man has a moral responsibility for his environmental decisions. The responsibility for preservation of the environment lies with the individual, the community, the state and the nation.

Man, being the only animal capable of completely destroying the environment for himself and other organisms, and being the only animal capable of mitigating this damage or repairing it, has a moral responsibility to reduce his impact upon the world in which he lives.

An important part of this complex problem is, of course, man's exploding population. Just a century or two ago, there was room for all, sufficient resources for man's needs, and plenty of space and resources for wildlife. Today man's numbers crowd wildlife and man's increasing demands for resources severely reduce wildlife habitat, deprive animals of food, water and shelter, and cast a blanket of pollution over our earth. All this makes it increasingly difficult for wildlife to prosper or even to survive. A major understanding should be that man *must* reduce his own numbers to comply with his habitat. A quality existence can be achieved only on an understocked habitat.

A land ethic must become a part of each person's way of life. We must realize that land, and all that lives upon it or acts upon it, is not ours to own, to use and abuse as we see fit. Each person much recognize that he is only a steward of these resources. They are ours only temporarily — to use, and care for, and pass on undiminished in quantity and quality. As we make this way-of-life, it will become goal, and policy and law for community, state and nation.

A Selected Ecology Vocabulary

ADAPTED-ADAPTATION — The process of making adjustments to the environment. Forests develop only where soil types, moisture and sunlight are balanced to the proper degree. Desert plants have made adjustments to be able to live under intense sunlight, on poor quality soils, and with a much reduced water supply.

AERATE — To supply with air or oxygen. To supply the blood with oxygen as is the function of lungs. To supply running water with additional oxygen as when a stream runs over falls or rapids, or when wind creates waves on a lake.

AQUATIC — Growing, or living in, or frequenting water.

BIOME — A large geographic area with somewhat uniform climatic conditions. Over a period of time certain plants have adapted themselves to live under these conditions. These plants are dominant in this biome and the biome usually gets its name from one of these dominant plants, i.e., the Forest biome, the Grassland biome, etc.

BROWSE — A general term, commonly used in wildlife management to signify leaves and twigs of brushy plants utilized by deer, elk, or cattle as food.

BOUNTY — A reward or payment for removing certain species of animals felt to be harmful. This action is slowly going out of practice.

CARNIVORE — A meat eater.

CARRION — Refers to dead animals or parts of dead animals.

CARRYING CAPACITY — The ability of a given unit of habitat to supply food, water, cover, and necessary space to a wildlife species. The largest population the unit can support on a year-round basis, or during the most critical season. Varies throughout the year. This number varies from year to year, depending on conditions within the habitat such as rainfall, competition from domestic animals, etc.

CLIMAX — The final stage of plant or animal succession. When environmental conditions have been stable long enough for an area to develop a semi-permanent biome. Rock crumbles, pioneering plants begin to grow in the sandy soil; as they add mulch and humus, other plants follow — from grasses to shrubs, to pine forest. If climatic conditions and soil types are proper, the climax species could be the pine forest. Animal types would follow this pattern of succession, ending perhaps with squirrels, porcupines and stellar's jays as climax species.

COMMUNITY — An association of organisms, plant and animal, each occupying a certain position or ecological niche, inhabiting a common environment and interacting with each other.

CONIFEROUS — Refers to cone-bearing species; a coniferous forest is composed of pines, firs, or spruces.

CONSUMER — The first part of an ecosystem is the non-living substance, the second part consists of those organisms which are called "producers" or food makers, part three of this system is called the "consumer" because it utilizes the producer for its food. It may in turn be used as food by a secondary consumer. A rabbit is a primary consumer. A fox would be a secondary consumer.

COVER — The vegetation, debris, and irregularities of the land that provide concealment, sleeping, feeding, and breeding areas for wildlife.

DECIDUOUS — Refers to trees that annually shed their leaves; also can refer to animal teeth — those commonly called "milk teeth."

DECOMPOSER — Those organisms (bacteria-fungi) which convert dead organic materials into inorganic materials.

DEPREDATION — The act of preying upon; usually used in relation to wildlife damage to man's crops or animals.

DIURNAL — Active by daylight; the opposite of nocturnal.

ECOLOGY — The study of the relation of organisms or groups of organisms to their environment.

ECOLOGICAL NICHE — That special place in a community which can be occupied by an organism. Where an organism lives, where it gathers food, where it seeks shelter. Who are its "friends and enemies," what does it give to the community, what does it take from it? These determine the "place in society" of this organism.

EDGE EFFECT — The tendency of most wildlife to concentrate at the edges of two adjacent vegetative or land use types. Where deer, for example, concentrate in an area where brush land and meadowland meet because of the nearness of food and shelter provided by the edge.

ENVIRONMENT — The total of all of the surroundings; the air, water, plantlife, human elements, wildlife — all that has influence on you and your existence. Both physical and biological factors are included.

ESTHETIC (AESTHETIC) — Relating to or dealing with the beautiful. An esthetic value related to the value placed on beauty.

EXOTIC — In conservation language this refers to a foreign plant or animal that has been introduced into a new area.

EXTINCTION — The act of removing from existence. An animal facing extinction is one in danger of vanishing from our world.

FERAL — Used in wildlife as referring to domestic animals gone wild, i.e., burros and "wild" horses, cats, dogs, and swine.

FORAGE — Refers to vegetation taken naturally by herbivorous animals, both wild and domestic.

FORBS — Refers to weeds and herbs; low-growing annual or perennial herbaceous plants.

HABITAT — The complex of soil, water and plants in which all wildlife exists. It is the "life range" which must include escape cover, winter cover, food and water, cover to rear young, and even cover in which to play.

HERBIVORE — A plant eater.

INSECTIVOROUS — Refers to insect eaters.

LICHENS — Algae and fungus growing together in a symbiotic relationship (Symbiotic: mutually beneficial in this case.) (See mutualism.) They form structures growing on tree bark and rocks.

LIMITED WELFARE FACTOR — A factor in the environment (a necessity of life) that if in some degree is in short supply for the number of animals present will restrict the population growth.

MICROCLIMATES — The climates of specific small areas are called microclimates. Microclimates are the tiny contrasts to the general climate of the area. A deep narrow shadowed canyon — cool and damp — might be a microclimate within a desert mountain range. The shady side of a huge boulder, or the area immediately surrounding a tiny spring would be classified as microclimates.

MICROORGANISM — An organism microscopic in size; can be seen only through a microscope.

MUTUALISM — A close association between two different species whereby each species derives some benefit. The Yucca plant and the Yucca moth each benefit from their relationship.

NOCTURNAL — Active by night; the opposite of diurnal.

PARASITE — An organism that lives in or on another living organism to obtain its food.

PREDATOR — A consumer that kills another living organism and eats it regardless of whether it kills it before or during the eating process.

PRODUCER — An organism that is able to make its own food and is eaten by other organisms. Green plants are the most important producers.

SCAVENGERS — An organism that habitually feeds on refuse or carrion. A coyote is a part-time scavenger, a dermestid beetle is a full-time scavenger.

SUCCESSION — The orderly, gradual and continuous replacement of plant or animal communities by others.

"TERRITORIAL IMPERATIVE" — The instinctive compulsion to gain and defend a territory. Many zoologists believe this drive to be more compelling and persuasive than the sexual urge.

WATERFOWL — Water birds, usually ducks and geese, but includes shore and wading birds also.

WILDLIFE — As discussed in this manual, it pertains to all free-living animals.

DOROTHY
DOWNING

CHAPTER 6

Investigating Wildlife

Topic Outline

- I. Wildlife is for Everyone
  - A. Variety of interests
    - 1. Aesthetic
    - 2. Economic
    - 3. Scientific
    - 4. Recreational
    - 5. Ecological
  - B. The relative importance of these different uses
  - C. Artistic value
- II. Wildlife Charactertistics
  - A. Visual observation
    - 1. Species
    - 2. Sex
    - 3. Age
  - B. Signs of wildlife
    - 1. Animal droppings
    - 2. Tracks
    - 3. Animal homes
    - 4. Other signs
  - C. Wildlife life histories
    - 1. Life span
    - 2. Reproduction characteristics
    - 3. Food
    - 4. Range
    - 5. Unique habits
  - D. Wildlife sounds
    - 1. Waterfowl
    - 2. Other birds
    - 3. Large mammals
    - 4. Predator calls
  - E. Unique wildlife
    - 1. Famous stories
    - 2. Common "wives' tales"
    - 3. Record-breaking wildlife
  - F. Awareness of wildlife
- III. Wildlife Ecology
  - A. The organism
    - 1. Population
      - a. Growth
      - b. Regulation
    - 2. Habitat
      - a. Limiting factors
      - b. Competition
      - c. Carrying capacity
  - B. The community
    - 1. Food pyramid
      - a. Producer
      - b. Consumer
    - 2. Food chain
      - a. Ecotones
      - b. Food webs
- IV. Wildlife Management
  - A. Nature of management
    - 1. History
    - 2. Philosophy
      - a. For the public
      - b. Agency responsibility
    - 3. Management dilemma
      - a. Extend value of natural resource
      - b. For which purpose is value to be extended
  - B. Management technique
    - 1. Habitat evaluation
      - a. Presence
      - b. Food
      - c. Cover
      - d. Space
      - e. Condition
    - 2. Population studies
      - a. Census (What's there?)

- b. Production potential (What will there be?)
    - 1) Age determination
    - 2) Sex determination
- 3. Manipulation of animals and habitat
  - a. Refuges
  - b. Stocking
  - c. Habitat restoration
  - d. Hunting

C. Control
- 1. Laws and regulations
  - a. Reasons for
  - b. Types
    - 1) Seasons
    - 2) Limits
    - 3) Restrictions
- 2. Enforcement (Wildlife Conservation Officer)

Curriculum Lesson Ideas

Topic I. Wildlife is for Everyone

OVERVIEW

Any management effort is less effective when the supportive public is torn between conflicting interests. Wildlife management often falls into this situation.

Without mutual understanding of opposing viewpoints regarding wildlife, it becomes unlikely that anyone's interests will be met. It is ironic since all groups share a common goal — the perpetuation of wildlife.

The purpose of this short topic is to expose students to the variety of interests people have in wildlife and to identify the common elements of each. Students will *respect* other people's interest in wildlife. If we can unite under common objectives rather than amplify these differences, greater progress can be made toward preserving our wildlife resource.

GENERAL BEHAVIORAL OBJECTIVES

The student will be able to:

Objective A: Identify the variety of interests people have in wildlife.

ACTIVITIES:

A-1 WILDLIFE FOR EVERYONE

Ask students to make a list of as many different uses for wildlife as they can think of. Be sure they include economic and ecologic uses. After each one, have them provide at least one example of such a use which relates to your area. Compare the individual lists and examples and discuss the differences.

The complete list should include:

Aesthetic (Esthetic)
Economic
Scientific
Recreational
Ecological/Biological

A-2 VESTED INTEREST GROUPS

Ask students to list all the possible groups of people in your community who have interests in wildlife. Include such groups as sport clubs, camera clubs, garden clubs, Sierra Club, Audubon Society, travel clubs, etc.

Invite members of these groups to class or drop them a note asking what they do to help the future of wildlife.

Objective B: Understand the relative nature of different wildlife uses.

B-1 WHAT'S THAT ANIMAL WORTH?

Have each student select a specific animal common to your area. You may want to assign animals to students to ensure that a variety of species are covered.

Ask students to provide as many specific uses for their animal as possible. For example, an elk has commercial, recreational and ecological uses.

After completing these lists, have them read their ideas to the class. Now, ask them to rank all the animals described from most important to least important. Compare lists and discuss the relative nature of a specific animal's "worth." How does this make management difficult? Will we ever be able to resolve such differences?

Objective C: Understand the artistic value of wildlife.

C-1 BIRD/DECOY CARVING

Bird or decoy carving is a popular hobby today. Ask a local woodcarver to demonstrate his or her craft, and explain where students can learn the skill and buy supplies or kits.

C-2 PHOTO AND ART CONTEST

Hold a student wildlife photo and/or art contest at your school. Ask a wildlife photographer or artist to judge and explain his or her criteria.

Topic II. Wildlife Characteristics

OVERVIEW

Ethical conduct or sportsmanship is based on knowledge and understanding. Knowing about an animal helps develop respect for its habitat requirements and its instinctive habits and traits. Too often wildlife sought in sport becomes secondary to the cause.

A hunter who genuinely appreciates an animal should live by the rules of "a fair chase" and "clean kill." Likewise, the sincere naturalist will avoid disrupting the habitats of animals he views. In either case, we are talking about having *respect* for the animal.

Wildlife photography can be exciting

APPROACH

There is more to experiencing wildlife than simply seeing animals in their natural state. The keen observer uses all his or her senses to discover the animals present, and total awareness is essential if we are to interpret wildlife as including all animal species from insects to large mammals.

Teachers should attempt to "sensitize" their students to the presence of animals. The best approach lies with challenging students to discover the many aspects of wildlife. If care is given to technique, ultimately you may produce a classroom of sincere "wildlifers." With this goal in mind, enrich the movies, the identification sessions and life histories with relevancy and excitement. Go out of your way to locate those *resources* which will do the job effectively.

GENERAL BEHAVIORAL OBJECTIVES

The student will be able to:

Objective A: Identify wildlife by visual observation.

ACTIVITIES:

A-1 A WILDLIFE NOTEBOOK

Have each student develop a notebook that will include drawings, photos or magazine pictures of common mammals, birds, reptiles, and amphibians of the local area. It is suggested that at least one page be devoted to each species so information on the species, name, size, description, life history, etc., may be included with the pictures. Teachers can prepare a standard "fill-in" sheet for use with the notebooks. A suggested "Wildlife Life History Form" can be found on page 76 at the end of this chapter. It should be revised for appropriate grade level.

A-2 AN OBSERVATION POST

Build a wildlife observation blind in a marsh, pond, near a water hole, in a prairie dog town, on a game trail and/or at the edge of a field where antelope, deer, or geese feed. Photograph the animals. Record data about your sightings. Include the species name, time, location and habits. Make a series of charts to cover a span of time. Note differences and similarities between species.

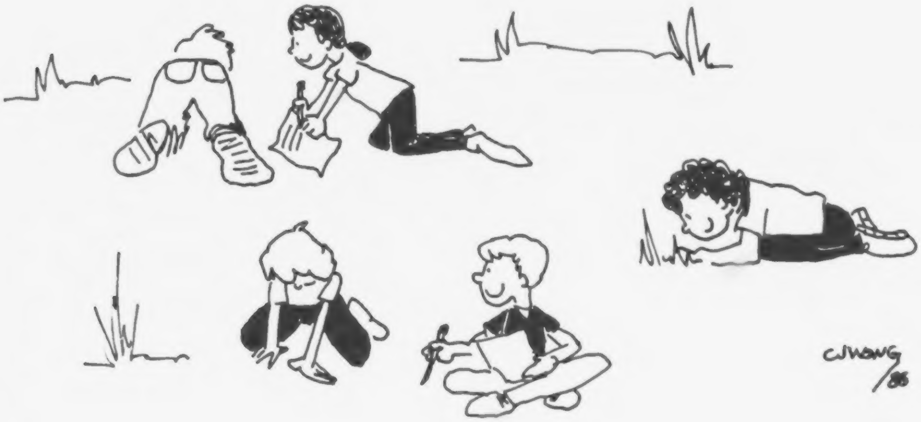
A-3 WILDLIFE FLASH CARDS

Paste cut-outs or photos on index cards with animal names and characteristics on the back. Test each other on identification ability. The same might be done with slides or filmstrips. Age and sex determination can be accomplished with this method also. The recorded animal sounds can provide excellent material for a quiz. If you don't have your own recordings, make up a quiz for local birds from a commercial bird call record or tape. (Also, see Activities D-1, D-3).

A-4 INCH HIKE

In a field, forest, vacant lot, or wherever, divide the students into pairs. Spread the groups out, and ask them to get down on their hands and knees. Using only his or her fingers, one student of the pair must gently push aside the soil and take a "hike" approximately 1 inch downward into the ground. The other student records on a piece of paper the insects, plants, rocks, etc., his or her partner sees on the hike, and where the findings are located. After the hike is completed, have the partners replace any logs or rocks moved during the activity. Ask them to move to a new location, switch jobs and repeat the hike.

Back in the classroom ask each team to draw what it saw on its hike, showing distance from the top of the soil. Have them present their drawings to the rest of the class, and discuss how the beginning of the hike differed from the middle or end.



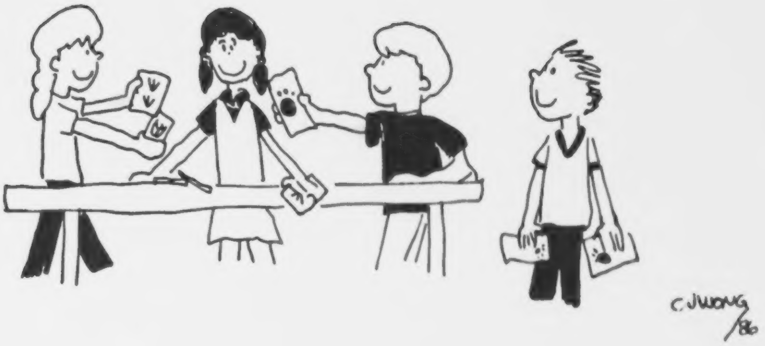
Objective B: Recognize Wildlife Signs

B-1 A TRACK COLLECTION

Using a reference book such as Peterson's *A Field Guide to Animal Tracks,* by Olaus J. Murie, reproduce the tracks of animals common to your area on 3" x 5" cards. Make several sets.

Follow up by searching for actual tracks in the field. Keep a record of species, their size, direction, location, etc.

Divide class into four to five groups and give each group a set of track cards. Tell them that they may classify the tracks in any way they wish. There is no right or wrong method. When they are finished, ask each group to explain how they grouped their tracks and why (three toes, four toes, claws, no claws, swimmers, etc.). Be sure the students understand why they placed a track in



a specific group. Classify or subdivide the tracks even further so the students see and make decisions about the differences among wildlife species.

B-2 THE PERMANENT TRACK — AN ANIMAL CASTING ACTIVITY

Directions provided on page 77.

B-3 WHO GOES THERE? SEARCHING FOR ANIMAL TRACES

An outdoor excursion enables students to collect photographs or drawings of other wildlife signs besides footprints. These would include gnaw marks, droppings, homesites, food remnants, etc.

It doesn't take much to locate minute traces of an animal's presence. To attune the senses to animal indicators, set up a micro-trail which students can crawl through to find animal signs. Insect traces, bird droppings, a feather, some hair, a mole tunnel, and the like test for alertness. The one who identifies the most signs wins.

B-4 SNOW TELLS ALL

Conduct field trips after fresh snow along a fence row, in a woodlot, marsh or pond. Record tracks seen with a camera, and identify later using reference material.

Objective C: Understand that the life histories of different animal species are unique.

C-1 THE MEDIA APPROACH

Using the best movies, filmstrips or wildlife books available (as indicated in the Reference List, page 85) students should complete a variety of life history forms prepared by the teacher. This activity may be combined with A-1, a wildlife notebook. (See example form sheet on page 76.)

C-2 AN ANIMAL HISTORY BOOKLET

As individual projects, have students collect pictures, bits of information and natural objects of their favorite wild animal.

For added incentive, display these booklets in a school showcase or in your room.

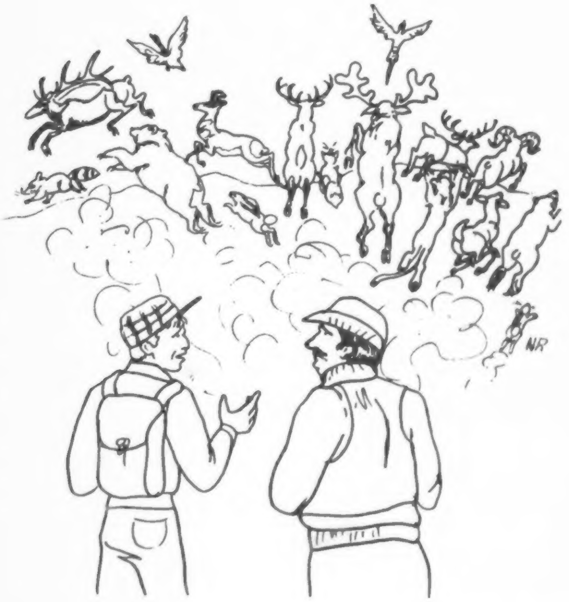
C-3 NATURAL HISTORY TRIVIA QUIZ GAME

From the information gathered so far, a selected class member gives clues, one at a time, to the class. The first member who correctly identifies the animal wins and is next to give out the clues.

Objective D: Recognize wildlife by sound.

D-1 WILDLIFE CALLS

Invite a duck, goose or turkey hunter to class for a demonstration of different calls. Record the session and use it for future reference.



Did you hear anything?

D-2 SIT AND LISTEN

Have the class go outdoors. After finding a good spot, have them sit down and remain quiet for two minutes. Discuss the variety of sounds heard. Ask what sounds were pleasing, obnoxious, different.

Do the same in different environments. If possible, use a cassette recorder to identify the variety of wildlife species at each location.

D-3 IMITATIONS

Collect and/or make a variety of calling devices such as moose, deer, goose, duck, predator, crow or elk calls. Allow students to practice their technique.

Without the aid of a call, ask students to imitate any animal whose call comes to mind.

Objective E: Appreciate unique characteristics of wildlife.

E-1 WILDLIFE STORIES

Collect sportsman or state wildlife magazines. Cut out and give reports on unique wildlife stories. Start a vertical file for each species. Discuss the merits of the stories.

E-2 THE OLD WIVES' TALES

Invite an experienced wildlifer in to discuss unique wildlife characteristics which have grown to be more myth than truth. Make a collection of "fables" and verify their merits with facts. Magazine articles can also be a source of "tall tales."

E-3 RECORD-BREAKERS

Most State Game and Fish Departments keep information on record-size wildlife. Using either this source or other resources, keep an active file of "trophy" animals from your state.

A comparison of average size animals to these records will initiate an interesting discussion. Talk about the animal's location and how it may have grown so large.

Objective F: To heighten awareness of and curiosity about objects through hearing, smell and touch.

F-1 BLINDFOLD SURPRISE!

Without using their eyes, students "get to know" natural objects in any way they can (hearing, smell and touch).

Directions provided on page 79.

Topic III. Wildlife Ecology: Interrelationships Between Plants, Animals, and the Land.

OVERVIEW

Unfortunately, the word "ecology" is often thought to be synonymous with "pollution." It is not. Ecology involves those balanced relationships between plants, animals, and the land. Here our purpose is to expose the student to basic principles which, as Aldo Leopold, father of American wildlife management, suggests, "bring man in harmony with the land."

APPROACH

There are a variety of exciting activities in the area of ecology for teachers to exploit. Most, however, require at least some biological background and access to the out-of-doors.

It is up to the teacher to decide "how far" to go with ecological studies. The activities given here provide exposure to only elementary concepts. Contact your science teachers and identify where coordination is possible.

An understanding of ecology is so closely tied in with sportsmanship that it is often overlooked. Perhaps this topic can offer a unique opportunity to develop science appreciation in students who are otherwise "turned off" by the subject.

GENERAL BEHAVIORAL OBJECTIVES

The student will be able to:

Objective A: Understand that animal population numbers are regulated by many natural factors.

ACTIVITIES:

A-1 POPPING POPULATIONS

If animal populations were allowed to expand unchecked by limiting welfare factors, an exponential population explosion would soon develop. To demonstrate this point, have students graph the "growth" of a popcorn population.

Obtain a bag of uncooked popcorn. Divide students into groups of three (one tosses, one counts, and one records). Have students toss two kernels into a tray (shoebox cover). For every one kernel there, throw two more kernels into the tray at 30-second intervals. Count and record the population for each interval until they lose count, or up to three minutes. Ask them to graph this relationship. Explain what exponential growth is.

Relate this to an uncontrolled robin population explosion if all could live and breed for five years. Discuss what factors actually keep populations in check.

Do the same for a litter of four (throw in four kernels instead of two). Compare these graphs. Discuss the consequences of such an increase.

A-2 WHERE ARE ALL THE ANIMALS?

Ask students to describe what factors might keep populations down. Include starvation, disease, exposure, predation, migration and accidents.

Compare the population of quail to deer after five years. Use the following data:

	Quail	Deer
Average life span	4 yrs	7 yrs
Maturity	1 yr	2 yrs
Average litter	12/yr	2/yr
Mortality rate	70%/yr	15%/yr

Explain why wildlife populations are usually different and constantly changing.

Objective B: Understand that an animal's needs determine its preferred habitat.

B-1 HOME SWEET HABITAT

Go outside and mark off a large area (field with diverse vegetation is best.) Using a measuring tape, divide the area into grids. Have students map the area.

Observe and identify animals (insects, birds, signs), noting their location. Compare the different animals by their locations. Are there differences? What are they? Why?

B-2 HABITAT ESSENTIALS

Obtain a map of your state. Outline with magic markers the range of five mammals which occupy different regions (pronghorn - open prairie, bighorn sheep - steep, rocky terrain, etc.). Life zones serve as ideal examples in mountainous areas. Make a list of each mammal's needs, such as food, cover, water and space.

From reference material, invent symbols to represent specific food, cover and spacing needs. Plot these on the map and discuss differences. What are limiting factors. Give examples such as:

Pheasant - winter cover - cattail patch
Deer - cover from wind, nutritious foods
Diving duck - deep, pure water, etc.

B-3 THE COMPETING BRINE SHRIMP

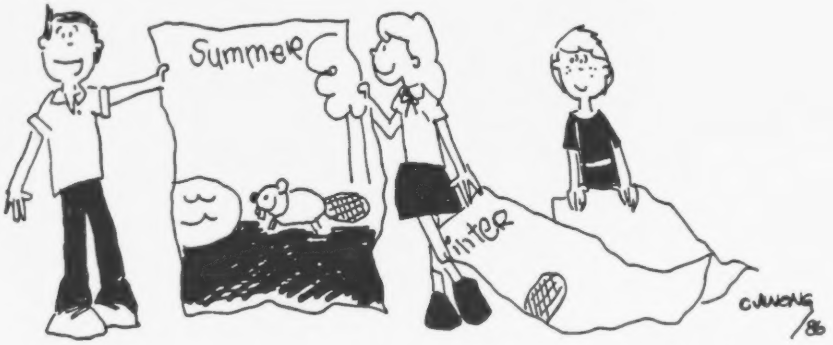
Hatch different numbers of brine shrimp in three small jars equal in size. (Shrimp eggs can be obtained from most pet stores or biological supply houses.) In the first jar put a ¼ pinch of shrimp eggs; a pinch in the second; and three pinches in the third. Use a quart of pre-boiled water with eight tablespoons of dissolved non-iodized salt. Keep the temperature between 70°-80°F. Add a pinch of brewers yeast to each jar per week. Compare the shrimp after two or three weeks. Record differences.

Discuss the terms "competition" and "carrying capacity" as they apply to shrimp and wildlife.

B-4 CONSTRUCT A HABITAT

Make flash cards of local wildlife. Divide class into teams of two or three, and have each group pick a card. Using butcher paper, ask each group to draw or construct its species' habitat for all four seasons of the year. Each of the four habitats must include *food, water* and *cover.* After drawings are complete, have each group present its picture to the rest of the class. The class must find all three habitat requirements in each drawing and decide if the animal can live in such a habitat.

Discuss where students have seen the wildlife on the cards (local park, open field, ditches, etc.) and how the animals obtain their food, water and cover.



B-5 BACKYARD HABITAT

Using *Kansas Fish & Game Elementary Series* (address on page 87) as a reference, build bird feeders from dried grapefruit rinds, coffee cans, milk cartons, detergent bottles, etc. As a class project place these at a nursing or retirement home, and work with citizen groups to supply the seeds.

B-6 BIRD HOUSES

Build bird houses for house wrens and/or bluebirds. Directions are provided on page 81. *Woodworking for Wildlife: Homes for Birds and Mammals* is an excellent reference for this activity (address on page 85).

Objective C: Understand the concept of biotic community.

C-1 THE COMMUNITY

Group students into teams. Go outside and identify distinctly different vegetative areas, such as a lawn, woods, an open field, marsh, or a pond. Assign a team to each area.

Using sweep nets, dip nets, magnifying lenses, egg cartons, trowels, pans and plastic bags, collect plant and insect specimens from each area. Minimize the impact by keeping animals live and taking only parts of plants, such as a leaf. Record or draw pictures of plants or animals that are not collectable. If equipment is handy, you may wish to measure physical factors of the micro environments, such as humidity, temperature, wind speed, soil type, depth and pH.

After collecting samples and data, regroup for comparison of the areas. Are there differences? Similarities? What and why? Identify your specimens as either producers, primary consumers, or secondary consumers.

C-2 COMMUNITIES CHANGE

For classroom observation, a cow dropping serves as a good example of community succession. Obtain some samples (three- to five-day-old droppings work best). Place these in gallon jars with perforated lids. Keep them moist by sprinkling every two or three days and maintain natural summertime conditions. (Don't worry, the smell passes within a day or two of collection.)

Within a week, an abundance of organisms will develop. Using a hand lens, ask students to record and estimate numbers of different organisms. Succession usually continues for eight to ten weeks. Experiment by subjecting your samples to different conditions.

C-3 SUCCESSION

Contact the local National or State Forest Service office for locations of old, recent and upcoming forest fire burn sites. Take a field trip to the areas and have students record the sequence of change, noting differences in plant and animal species and number at each site.

Or observe succession on a nearby plowed field, vegetable garden, vacant lot, landslide, or abandoned road.

C-4 FOOD CHAIN MOBILE

Cut out or draw pictures of plants and animals that exemplify food chains. Paste these on cards and assemble food chain mobiles. Include man as part of food chains. For example: algae-insect larvae-minnow-bass-man; or twigs-deer-man.

What type habitat is it suited for?

C-5 PREDATOR/PREY PREDICAMENTS

Pick several examples of predator/prey species. Construct a chart which provides the following information for each:

No. young/litter
No. litters/year
Reproduction age
Life span.

Compare these lists and discuss the population relationships between various predator/prey species.

C-6 PREY ADAPTATIONS

a. Creating Creatures.

Obtain an assortment of vegetables such as carrots, potatoes, string beans and squash. Paint them with white latex. Using tempera colors, challenge students to paint the animals to represent camouflage coloration which matches different habitats around the school yard. Have students hide their animals and challenge others to find them.

b. Toothpick Game.

Obtain a box of colored toothpicks. Separate them by colors of equal numbers. Mark off an outside area, say 10′ x 10′ and stick them into the ground randomly. Have students look for toothpicks for 10 minutes. Record which colors are found first, second, etc. Discuss the results in terms of wildlife coloration.

c. Predator Adaptions.

Using vegetables such as in (a) and an assortment of paper clips, toothpicks, wire, pipe cleaners, tacks, natural objects, glue, etc. Challenge students to assemble predator devices for different purposes. Create feet, mouths, or tongues designed for tearing, probing, grabbing, cracking or sticking. Have students discuss their device, including its function and intended prey.

C-7 THE PREDATION GAME

By becoming predators themselves, students learn the principles of predation and predator-prey relationships. For directions see page 83.

Objective D: Understand that interrelating communities are components of an ecosystem.

D-1 AN ECOSYSTEM

Putting together an aquarium is nothing new; but assembling a complete miniature natural ecosystem is. The challenge is to use nothing artificial and to maintain a biological and physical balance between all the interrelated components. Ask a biology teacher for instructions.

D-2 THE "EDGE EFFECT" IS AN ECOTONE.

Study a pond or stream area. Identify where most of the animal life occurs (usually at the water's edge). Discuss why animals might prefer to live at the "edges" of different communities. Illustrate the point by citing other communities like forests and meadows, or hedgerows and corn fields.

D-3 THE WEB OF LIFE GAME

Make several signs representing many of the components of an ecosystem. Include animals, plants, soil, water and the sun. Several animals and plants that are part of interconnecting food chains should be worked out beforehand.

Students should pick a sign and wear it. Have them sit in a circle facing each other. Next, connect all the components (students) which are related to each other by telling them to grab hold of the string from your ball. The web should be pretty complicated before you're finished.

After everyone is "connected," ask one essential component to drop the string. This represents elimination from the system. Any other related components should also drop the string.

What happens to the system? Discuss the concept of interrelationships within ecosystems. How does man help keep the system in balance?

Topic IV. Wildlife Management

OVERVIEW

The status of most wildlife in America has greatly improved since the early 1900s. Unfortunately, as man's activities expand, subsequent habitat loss and pollution take their toll.

Good wildlife management is the essential step in preserving this renewable resource, but it alone will not be enough. Sportsmen and lay citizens alike must assert moral responsibility in making wise environmental decisions; an active role must be taken to improve and preserve habitat; and we *must* strive to teach all others the facts about sound wildlife management programs.

APPROACH

After students are acquainted with the principles of ecology, they should be ready to proceed with concepts in wildlife management. Several useful booklets are available from the sources cited in the Reference List, page 85. The following activities should serve as supplemental experiences to these readings. It is the teacher's responsibility to be thoroughly informed about both sides of wildlife-related issues. As a result, the activities will provide greater meaning and benefits in terms of public understanding, support and involvement in management programs.

GENERAL BEHAVIORAL OBJECTIVES

The student will be able to:

Objective A: Understand that the greatest asset to management programs is public support.

A-1 HISTORY OF WILDLIFE LEGISLATION

Divide students into groups. Using the book *Wildlife Conservation, Principles and Practices* and other reference material, have students report to the class on the following:

1. The Lacey Act of 1900
2. Migratory Bird Treaty Act of 1918
3. The American Game Policy of 1930
4. Migratory Bird Hunting Act of 1934
5. Pittman-Robertson Act of 1937
6. Dingell-Johnson Act of 1950
7. Endangered Species Act of 1973
8. Special state statutes regarding wildlife management
9. Other current legislation

Discuss the benefits of wildlife from these acts.

A-2 WILDLIFE IS PUBLIC PROPERTY

Write to your state game agency asking for policy statements on wildlife management. Ask students to discuss the philosophical questions of what wildlife is and who wildlife belongs to. Does wildlife include game and non-game animals with backbones only? Does wildlife belong to everyone? Who should manage wildlife and for what purposes? Compare and discuss class answers with federal and state policies.

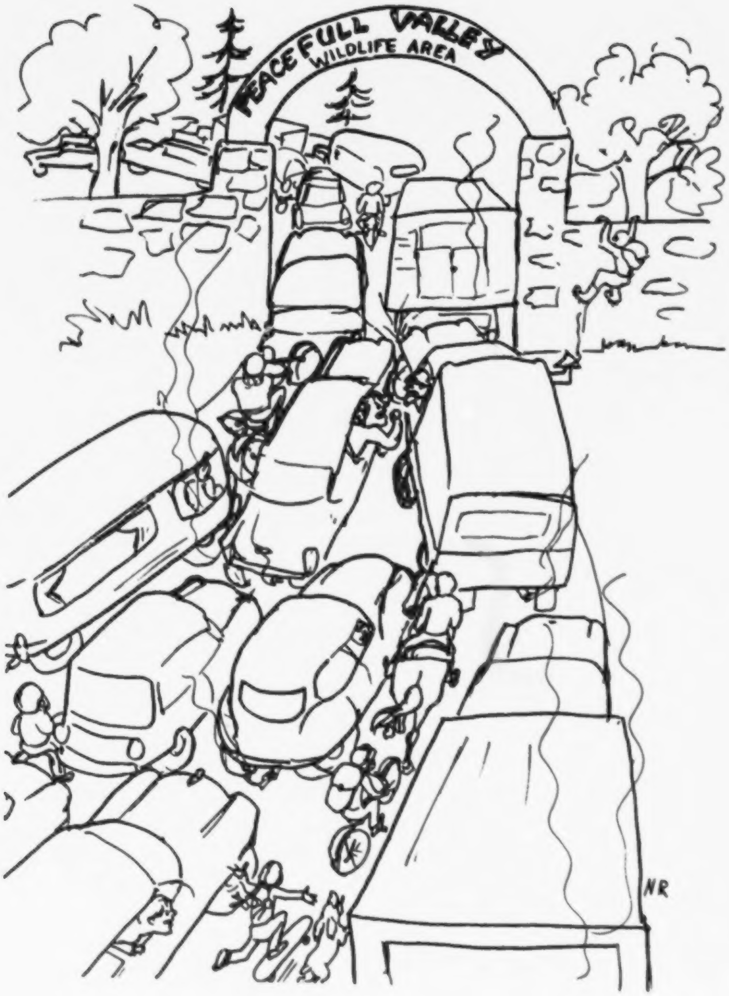
A-3 WHOSE INTERESTS ARE TO BE MET?

Allow students to identify as many groups with different viewpoints about wildlife management as possible. Include farmers, developers, hunters, and preservationists. Send for the booklet and/or filmstrip "What They Say About Hunting" from the National Shooting Sports Foundation (address in reference section at end of chapter). Build up a "position file" of newspaper and magazine articles. Debate the issues and follow up with a discussion of how the best management program can be attained. Attempt to draw conclusions reflecting public understanding and compromises to the benefit of all wildlife.

Objective B: Understand the concepts behind wildlife management techniques.

B-1 HABITAT EVALUATION — THE COVERMAP

After discussing the aspects of good habitat for certain animals, have students select small study areas of their choice. These could include a portion of farmland, open meadows, woodland, lakes, ponds or streams. Make a map showing various vegetation types — old fields, brush row, crops, bare ground, woodlots, marsh, etc. Using a record sheet, ask them to rate the habitat's



Whose interests will be met without management?

condition as poor, fair, good or excellent based on their observation of the following: food (quantity and quality), cover, water, space. Be sure to indicate what wildlife species the rating is for. Indicate wildlife seen and signs of wildlife.

Discuss reports in class and mark these ratings on a county map.

B-2 POPULATION ESTIMATES

Discuss why it is important to know how large an animal population is for successful wildlife management.

Separate students into teams. Each team is given a labeled shoe box containing different numbers of popcorn kernels. The box bottom should be at least covered with kernels. Only the teacher knows what the actual amount in each is (P).

Have each team take out three finger pinches of kernels. Count them, mark them with a magic marker (Pm) and put them back in the box. Shake the box to randomly distribute the kernels.

Ask a blindfolded students to again randomly pick out three pinches of kernels. Count the kernels again noting those that are marked (m) and unmarked (u). Use the following formula to determine the entire population.

IF

$$\frac{\text{Population (P)}}{\text{Marked Population (Pm)}} = \frac{\text{Total Kernels Returned (u+m)}}{\text{Marked Kernels Returned (m)}}$$

THEN

$$P = Pm \times \frac{u + m}{m}$$

Discuss how this activity applies to mark and recapture techniques used by game biologists. What animals are tagged for this purpose? What are the limitations of such a method? What other methods are used to determine populaton size?

B-3 AGE AND SEX DETERMINATION

Discuss the importance of knowing age and sex structures for determining population production capabilities. What is the difference between monogamy and polygamy?

Using whatever sources are available, collect a variety of duck wings and deer and elk jaws. Your local university or Wildlife Conservation Department may be of assistance.

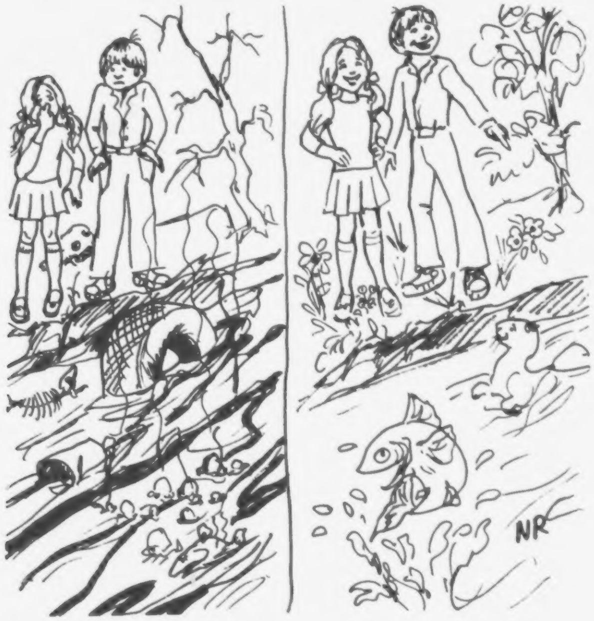
Using reference material such as the Wildlife Society's *Wildlife Management Techniques*, practice age and sex determination based on plumage and tooth erosion. Discuss other methods as well. Why should a hunter be able to identify an animal's sex and age in the field?

B-4 THE MANAGEMENT EXPERT

Invite a wildlife biologist to class to discuss the various means of putting habitat and wildlife in balance. Discuss the role of refuges, stocking and habitat restoration. Visit a refuge or rearing area if possible.

B-5 HABITAT RESTORATION

Knowing your habitat is a critical factor for wildlife, examine the possibilities in your area for habitat restoration projects. Backed by the advice of game biologists, students can restore habitat by using the following procedure:



Real life projects provide incentive to learn

1. Develop a wildlife "mini-area" in the schoolyard for wild birds by planting a "thicket" of various trees and shrubs. "Gardening with Wildlife" by the National Wildlife Federation is a good guide.
2. Identify areas where habitat restoration is possible, such as along fence rows, ditch and row banks, field edges or other unused land.
3. Draw up a set of plans that could help improve habitat conditions, such as planting food, building brush piles, or creating wetlands.
4. Contact the landowner and ask him if he would cooperate in improving wildlife habitat on his land.
5. If so, offer your suggested plan to him. Volunteer your services if your help can be used.

B-6 HUNTING AS A MANAGEMENT TOOL

Assuming that some big game (mainly deer) populations may reproduce beyond the carrying capacity of the land, ask students to discuss practical and impractical methods of keeping populatons in balance. What results occur if balance is not maintained?

Discuss the pro and con arguments dealing with hunting as a management tool. Discuss the feasibility of alternative population control methods. Include financial and administrative possibilities.

Objective C: Recognize that laws and enforcement are important wildlife management tools.

C-1 KNOW THE LAW

Obtain copies of current state hunting, fishing and trapping laws and regulations. Divide these laws and regulations among groups of students. Have each group describe the possible reasons behind each law and regulation. Compare results between groups.

C-2 GAME CHARTS

Have students make a chart of legal hunting regulations on various game species such as limits, seasons, sex limitations, and other restrictions. Compare these charts with productivity information gathered for Topic II in Wildlife Characteristics.

C-3 THE OFFICIAL WORD

Invite a Wildlife Conservation Officer (Game Warden) to class to discuss the purpose and policies of his agency. Ask him to explain the rationale and methods for establishing fees, limits, seasons, and restricted areas. Have him also discuss enforcement techniques such as penalties and their effectiveness.

Note to teacher:

After the students have completed this chapter they should realize that:

a. Habitat is the most vital factor for wildlife survival. You may have habitats without wildlife, but you cannot have wildlife without suitable habitat.

b. Wildlife populations are dynamic, changing throughout the year. The smaller mammals and birds normally produce large annual surpluses which are subsequently subjected to high mortality. Part of this annual surplus in some species (small game - rabbits, quail, doves, etc.) may be diverted to sport hunting as part of that mortality. Big game animals have lower mortality rates and often must be harvested so that herd numbers keep within the carrying capacity of the habitats.

c. People have several interests (or values) related to wildlife. People determine these values, not the wildlife.

Activity A-1

Investigating Wildlife, Topic II, A-1
WILDLIFE LIFE HISTORY FORM

Animal Name	Common	
	Scientific	
Description	Weight	Height
	Length	
	Color	
	Seasonal Changes	
	Sexual Differences	
Reproduction	Breeding Season	Gestation Period
	Litter/Clutch Size	
	Number of Litters/Clutches Per Year	
	Age of First Breeding	
Habitat Requirements		
Food Habits		
Life Span		
Miscellaneous	Interesting adaptations, legal status, values (on back).	

Activity B-2

Investigating Wildlife, Topic II, B-2

THE PERMANENT TRACK — AN ANIMAL CASTING ACTIVITY

Time: Depends on location and number of animal tracks to be taken.

Materials: Tweezers, can of pressurized shellac or plastic coater, long strips of construction paper of about 2" and 4" widths, plaster of paris, plastic mixing bowl, water, Vaseline, black poster paint, and paper clips.

Purpose: Considerable information about wildlife in your area can be obtained by "reading" animal tracks and preserving them in plaster. Not only does such an activity arouse interest relating to animal habits in general, but it also brings to view the many aspects associated with the skill of stalking wildlife.

Pre-activity discussion: Start by asking students where tracks might be found for certain animals common to your area. Ask students to list the information needed to determine what an animal's particular activity was at the time the track was made. Use these lists for developing a "track information observation sheet." Information to be considered might include: the animal's direction, speed of travel, rate of animal's speed, other associated animal signs, track specifications (size, number of toes, depth, age of track, etc.), and surrounding habitat.

Procedure:

1. Clean the track to be cast by picking needles, leaves and the like out with tweezers.
2. Spray track with shellac or plastic coater.
3. Encircle track with 2" wide cardboard strip and secure with paper clip. Press the cardboard into soil firmly enough to allow for about an inch thick mold to be poured.
4. Prepare plaster of paris in mixing bowl by adding water to about a pancake batter consistency.
5. Pour plaster of paris mixture over track and allow it to harden.
6. Lift cast. Remove cardboard molding. Clean off sand and debris carefully with pocketknife. Coat cast with Vaseline.

7. Surround casting with a 4" wide cardboard and again secure with paper clip.
8. Pour a new batch of plaster of paris level with top edge of cardboard mold.
9. Separate the two layers of casting when hard. Clean Vaseline from track and smooth again with knife blade.
10. When cast is completely dry, paint the side of track with black poster paint.

Follow-up Suggestions:

Students should have track information cards for each track cast. When a number of tracks have been collected, identification quizzes may be used to test the "experts." A comparison of tracks from different locations or over a span of time from the same location may prove interesting. Labelled track collections mounted on masonite boards make such observations much easier. Whatever your follow-up involves, be sure you have included a final discussion of the variety of information tracks "tell" as mentioned in the Pre-Activity Discussion.

Activity F-1

Investigating Wildlife, Topic II, F-1

BLINDFOLD SURPRISE!

Time: 45 minutes

Materials: One object per student: skulls, leaves, woods, seeds, nuts, rocks, fruit, etc.

Purpose: To heighten awareness and curiosity of objects through hearing, smell and touch. Depending on your objectives, you may use this activity to introduce a unit, or to further explain a subject area.

Procedure: Seat participants in a circle and pass out blindfolds to each student. Explain that you are going to give them each an object that they should get to know in any what they can *without* using their eyes. They should get to know it well enough that they could pick it out of a pile of similar objects (you may need to reassure them that you're not giving them something that will hurt them). Ask them not to say anything, and hand out the objects.

As you place the "extras" in the center, begin to ask a series of questions which will help the student get to know the object if he/she answers it to him/herself: How big is the object compared to your hand? How heavy compared to a slice of bread? Is it cold or warm on your cheek? Does it have any rough or sharp places, or is it smooth? Is the texture uniform or does it change? How hard is it? Does it have any "caves" in it? Could you hide in it if you were a spider? Does it remind you of the shape of some letter of the alphabet or a common household utensil? What does it smell like? Is it hollow or solid? The possible questions are many.

Next, ask each student to describe his/her object to the group without using its name or the name of its parts. This gets everyone to verbalize, often bringing out otherwise shy people. Listen carefully as the descriptions are often incredibly creative!

After all the descriptions are given, ask them to take their last feel of the object. Pick up the objects and place them in the center with the extras (HINT: Devise a system for remembering who had what). When all objects are in the center, remove and collect the blindfolds.

First ask them to try and spot their object with just their eyes. When they are "sure," they may retrieve their own. Much hubbub and comparison usually follows. If they have any difficulty, closing their eyes often helps (Alternatives: Instead of having them pick "their" objects immediately, have each draw their own object as they visualized it — then see the actual object and compare).

Place the objects in groups — perhaps having students decide how to group them. Discuss (Note: The discussion is the "meat" of this activity, and proceeds based on your objectives, i.e., with skulls you might group them by herbivores vs. carnivores and discuss adaptations; with rocks you might group by hardness and discuss rock type formation; with leaves you might group into smooth vs. hairy and discuss adaptations or identification). Whatever the case, *do not* name anything until the concepts you've wanted to bring out are discussed. Once a label is on an object, students often stop thinking.

Follow-up: Naturally, the follow-up depends again upon the objects used and the objectives accomplished. Skulls may lead to other research on predators and prey or displays of other adaptations. Rocks may lead to other activities dealing with geology, or investigation of crystals, volcanoes, glaciers, or local geology. Leaves may branch out into displays, identification or research on plant adaptations. Yours and your students' creativity is the only limit!

Adapted from "Blindfold Surprise!" in *Birds, Beasts, Bugs and Us: activities for environmental education* by Jim Pease, Cooperative Extension Service, Iowa State University, Ames, Iowa 50011. 1985, 44 pp.

Activity B-6

Investigatng Wildlife, Topic III, B-6

BIRD HOUSES

House wren

House wrens generally nest in wooded, shrubby habitats. Their nests are characterized by twigs and the 6-8 eggs are finely speckled with reddish spots. Sometimes wrens will take over the nest of a tree swallow or eastern bluebird after puncturing the eggs of the other birds with their bills.

Location: House wren nest boxes are likely to be used if they are 5-10 feet above the ground and located under the eave of a building or in a tree.

Materials:
One 1" x 6" x 4' piece of lumber
Several nails
Eye-screw (optional)

Construction: The entrance hole for a wren house should be 1" in diameter. A 1¼" hole also allows use by chickadees and nuthatches.

The house wren box is the only kind of bird house which can be free-hanging from an eye-screw. All other bird houses must be firmly anchored.

Don't put a perch on the nest bow. Perches invite unwanted house sparrows to try and use the nest.

As soon as one family of wrens leaves a house, clean it out so another brood of young ones can be raised. This house is also suitable for the black-capped chickadee, white-breasted nuthatch, prothonotary warbler, and deer mouse.

Bluebird

Ideal bluebird habitat is comprised of mixed forests and grasslands. The grassy areas may be either meadows, pastures, yards, cemeteries, highway rights-of-way, or prairies. It is best if the grass is short or sparse. Mowed or grazed areas provide good habitat. Bluebirds will normally nest in rural nest areas away from farmstead sites, because competition with house sparrows is usually too great near farmsteads.

Bluebird nests are neat, cup-shaped structures made of fine grass. Usually there are five pale blue eggs in a clutch.

Location: Bluebird houses should be placed 4-6 feet above the ground and spaced about 100 yards apart. A bluebird trail consists of 5 or more houses placed along a road or fenceline.

The entrance hole should face north, east or northeast to prevent sunlight from shining into the hole and overheating the box interior.

Because this type of house is vulnerable to predation by house cats, it is best used on free-standing posts which have tin or aluminum sheets stapled around the support post.

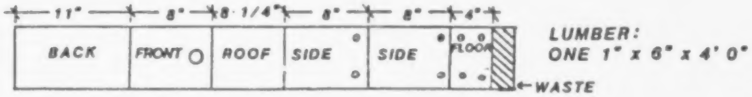
Materials:

1" x 6" x 6' piece of lumber
Several nails
Free-standing posts (optional)
Tin or aluminum sheets (optional)
Staples (optional)

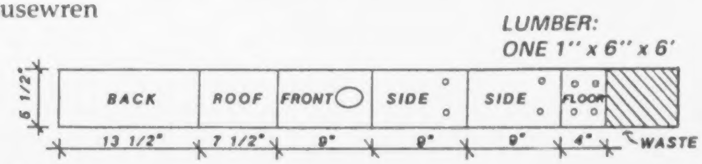
Construction: Some people feel that a 3" diameter hole in the roof covered with ¼" or ½" hardware cloth mesh discourages sparrow use. Bluebirds, however, don't seem to mind this "sunroof."

Bluebird houses should be checked every week to 10 days from late March until mid-August. A nest should be removed as soon as a brood leaves its nest box. This allows a second brood to be raised. This box can also be used for tree swallows and for great crested flycatchers with modified entrance hole (see instructions).

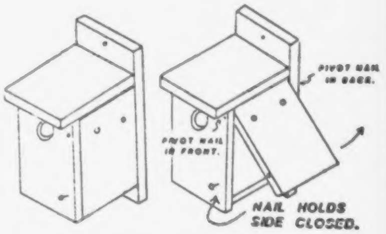
Adapted from *Woodworking for Wildlife: Homes for Birds and Mammals.*


11"
8"
8 1/4"
8"
8"
4"
BACK
FRONT
ROOF
SIDE
SIDE
FLOOR
LUMBER:
ONE 1" x 6" x 4' 0"
WASTE

Housewren


LUMBER:
ONE 1'' x 6'' x 6'
5 1/2"
BACK
ROOF
FRONT
SIDE
SIDE
FLOOR
13 1/2"
7 1/2"
9"
9"
9"
4"
WASTE

Bluebird


PIVOT NAIL IN BACK.
PIVOT NAIL IN FRONT.
NAIL HOLDS SIDE CLOSED.

TWO "PIVOT" NAILS ALLOW SIDE TO SWING OUT FOR CLEANING.
USE ONE NAIL AT BOTTOM TO CLOSE SIDE.

Activity C-7

Investigating Wildlife, Topic III, C-7

THE PREDATION GAME

Time: 1 - 1½ hours

Materials: Wrapped caramel candies (two flavors — *Carmelatus*, spp.) or peanuts in the shell (20-25 pieces for a group of 10-13), graph paper and pencil, masking tape for marking prey (optional), an area with a lot of "edge" (where two habitats meet) and an opening in the middle, a leader with the ability to keep a straight face (a MUST!)

Purpose: To have students graphically understand principles of predation and predator-prey relationships by becoming predators themselves. To explore the population dynamics of an artificial population of animals.

Pre-Activity: Student should know what predator, prey and predation mean. Pick your area beforehand, and distribute the "animals" (candies) beforehand. Do not hide them too much — rather, put some in the open, some "out sunning" themselves, some in stump crevasses, etc.

Procedure: Before departing for the site, begin by asking what a "predator" is, how they obtain food, examples of predators, and what a study site is. Explain that they are going to become predators (more than they already are) by hunting down, skinning and eating a small animal that lives in the study area (watch the groans of disbelief!).

Without using its real name, describe the "animal" as completely as possible: very quiet and unobtrusive, no common name, scientific name is *Carmelatus*, about 1 inch long, females are light brown, males are dark brown, *very* slow moving, likes "edge" habitat, prefers sunning itself on leaves, dislikes full sun, dies immediately upon being touched, thin skin (you can skin it with your fingernail), etc. (go ahead — HAM it up!)

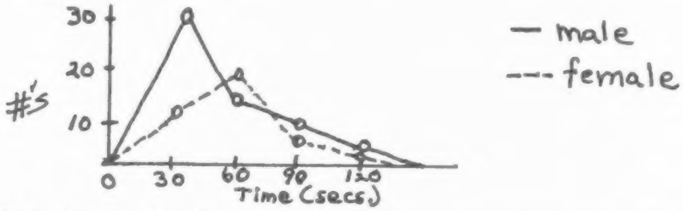
En route to the study area, briefly visit several possible habitats (parking lot, field, pine woods, edge), asking the students if these sites are suitable for *Carmelatus*.

When you are near the area, explain that you're going to make a game of the activity. Students have one minute to find a prey *(Carmelatus)*. If they do not find one in that time, they must drop out as "dead predators." If you wish to consider sex ratios in wildlife populations, have the students yell out "male" or "female" as they find the animals. Keep a tally like the following:

	Male	Female
30 sec.	10	5
1 min.	5	6
1½ min.	3	2
2 min.	1	0

Ask for questions, and then let them go! When the last predator has "died" (usually in 4-5 minutes), gather them together in a circle to discuss what has occurred. The discussion can lead a myriad of directions, depending on the interests of the group.

You might graph the results of your tally, which might look as follows:



Discussion can begin around the graph and continue to reasons for uneven sex ratios, search strategies, food chains and webs, food and energy pyramids, why they could not find all the prey, etc.

Follow-up:

This is a tremendous activity for learning principles of predation. It might be followed by "Blindfold Surprise!" or activities on habitat. Students might want to do research into rare and endangered species, predator strategies and adaptations. Check with local wildlife conservation officers to see what wildlife research is going on in nearby areas.

Adapted from "The Predation Game" in *Birds, Beasts, Bugs and Us: activities for environmental education* by Jim Pease, Cooperative Extension Service, Iowa State University, Ames, Iowa 50011. 1985, 44 pp.

SAFARI CLUB INTERNATIONAL CONSERVATION FUND'S EDUCATIONAL PROGRAMS

Safari Club International founded SCICF in 1973 to preserve conservation education programs initiated by governmental agencies but later weakened by funding cuts. SCI stepped in to keep these vital conservation education programs alive, using the resources of its chapters throughout the world.

As its focal point, SCICF developed the American Wilderness Leadership School (AWLS) in 1976 to reach out to students and teachers with the message that wise use of our natural resources is vital to the future of the country.

In 1982 SCICF purchased the Granite Ranch southeast of Jackson Hole, Wyoming, within the Gros Ventre Wilderness area of the Bridger-Teton National Forest. The site, surrounded by over four million acres of public lands, was chosen not only because of its spectacular natural beauty, but also because its location contains all the elements and issues essential to the study of contemporary natural resource and management problems.

SO THAT THE WORK CAN CONTINUE . . .

The Safari Club International Conservation Fund's education and action programs depend on the interest and support of individuals, corporations, and other organizations.

SCICF invites and urges these individuals and groups to participate in our projects so vital to the nation's future by making contributions and by taking an active interest in their progress as members of Safari Club International.

When you join SCI, you become a better informed hunter and conservationist...and your dues work to protect your rights to hunt wherever in the world you go. SCI is the organization that cares about responsible hunting and conservation.

In addition, the SCI Lionesses were founded in 1984 by the ladies of Safari Club International. Their goal is to promote the educational programs of the Safari Club International Conservation Fund.

Safari Club International Conservation Fund is a tax-exempt organization and has a 501 (c) (3) status under the U.S. Internal Revenue Code. Contributions are tax deductible.

Please send additional information materials and application forms for:

AWLS sessions: ☐ Students ☐ Teachers ☐ Both

Membership: ☐ SCI ☐ SCI Lionesses Sponsorship: ☐ Student ☐ Teacher

Please send me an SCI Catalog ☐

Name: ____________________

Address: ____________________

____

City____________ State ____________ Zip ____________

Mail to: Education Director, SCICF, 5151 E. Broadway, STE. 1680, Tucson, AZ 85711

Reference List — Wildlife

Books

Big Game of North America, J. Schmidt & D. L. Gilbert, Stackpole Books, Harrisburg, PA. 1980.

Birds of North American — A Guide to Field Identification. C. S. Robbins, B. Bruun, and H. S. Zim. Golden Press, N.Y.

Conservation Directory, annual publication of the National Wildlife Federation (1412 Sixteenth St., N.W., Washington, D.C. 20036) which lists addresses of most federal and state conservation agencies and organizations.

A Field Guide to Animal Tracks. Olaus J. Murie, Houghton Mifflin Co., Boston. 1974.

Fieldbook of Nature Photography. Patricia Maye, Sierra Club Books, San Francisco. 1974.

A Field Guide to the Birds. R. T. Peterson, Houghton Mifflin Co., Boston. 1974.

A Field Guide to the Mammals. 3rd Ed. William H. Burt and Richard P. Grossenheider, Houghton Mifflin Co., Boston. 1976.

Field Guide to the Birds of North America. Shirley Scott (Ed.), National Geographic Society, Washington, D.C. 1983.

The Hungry Bird Book — How to Make Your Garden Their Haven On Earth. R. Arbib and T. Soper, Taplinger, N.Y. 1971.

Principles of Wildlife Management. James Bailey, J. Wiley and Sons, N.Y. 1984.

Reading the Woods: Seeing More in Nature's Familiar Faces. Vinson Brown, MacMillan, N.Y. 1973.
An excellent natural history book which explains relationships between the climate and the woods, fires and rebirth, and reading signposts.

A Sand County Almanac. Aldo Leopold, Ballantine Books, Inc., N.Y. 1974.

Wildlife Biology. 2nd Ed. R. F. Dasmann, John Wiley and Sons, Inc., N.Y. 1981.

Wildlife Conservation — Principles and Practices. R. D. Teague and E. Decker (Eds.), The Wildlife Society, Washington, D.C. 1979.

Wildlife Identification Pocket Guide. Published by Outdoor Empire (511 Eastlake Ave. E., P.O. Box C-19000, Seattle, WA 98109).

Wildlife Management Techniques Manual. 4th Ed. Sanford D. Schemnitz (Ed.), The Wildlife Society, Washington, D.C. 1980.

Woodworking for Wildlife; Home for Birds and Mammals. C. L. Hendersen, Minn. Dept. of Natural Resources. 1984.

Your Local University or College Bookstore. Ask for a list of technical publications on birds and mammals in your state.

Magazines

Field and Stream, Outdoor Life and Sports Afield — at news stands.

Colorado Outdoors. Colorado Division of Wildlife, 6060 Broadway, Denver, CO 80216.

Your State Wildlife Conservation Agency Magazine. Request subscription for your school. Audubon Magazine, National Audubon Society, address below. National Wildlife, National Wildlife Federation, address below.

Organizations, Associations, etc.

Your State Wildlife Conservation Agency. Request list of available films, books and pamphlets.

Council for Wildlife Conservation and Education, Inc. (P.O. Box 1075, 1075 Post Rd., Riverside, CT 06878). Ask for film "Wildlife For Tomorrow" on the role of hunters in wildlife conservation.

Ducks Unlimited (P.O. Box 66300, Chicago, IL 60666). Write for list of films on waterfowl natural history and management, and hunting.

Local 4-H. Request list of available lesson plans, activities, booklets, and other teaching material.

Minnesota Dept. of Natural Resources (Box 7, 500 Lafayette Rd., St. Paul, MN 55146). Publishes "Woodworking For Wildlife," an excellent how-to booklet on houses for birds and mammals.

National Audubon Society (950 Third Ave., New York, NY 10022). Ask for list of publications and educational material.

National Shooting Sports Foundation (P.O. Box 1075, Riverside, CT 06878). Ask for pamphlets "Films on the Outdoors" and "Promotional Literature." Booklets and pamphlets on hunting's role in wildlife management are available and very informative.

National Wildlife Federation (1412 Sixteenth St., N.W., Washington, D.C. 20036). Request "Conservation Education Catalog" for list of books, booklets, curriculum, references, and educational programs.

Wildlife Management Institute (Suite 725, 1101 14th St., N.W., Washington, D.C. 20005). Write for list of books, booklets and pamphlets on wildlife management, natural history and current issues.

Board Games

Extinction: The Game of Ecology by Stephen P. Hubbell. Illustrates key principles of population ecology, using concepts of reproduction, migration, competition, predation, and genetic change. Ages 14 - adult. Order from Carolina Biological Supply Co., 2700 York Rd., Burlington, NC 27215.

Oh My Deer by Dr. James E. Applegate. Players as wildlife managers must make decisions affecting herd population size and fate. Jr. High — College. Order from Carolina Biological Supply Co.

Pollution by the Education Research Council of America. Students assume the roles of industries, businesses and pollution control agencies, and experience the frustration of conflicting goals. Jr. High - adult. Order from Carolina Biological Supply Co.

Other Teaching Packages

Bosque del Apache National Wildlife Refuge Educational Activity Guide. April Fletcher, Conservation Education (U.S. Fish and Wildlife Service, 500 Gold Ave, S.W., Albuquerque, NM 87103).

Class Project, National Wildlife Federation (1412 Sixteenth St., N.W., Washington, D.C. 20036).

Issue Pac. U.S. Fish and Wildlife Service (Washington, D.C. 20240).

Kansas Fish and Game Elementary Series. Joyce R. Harmon, Wildlife Education Coordinator, Kansas Fish & Game Commission (Box 54A, Rt. 2, Pratt, KS 67124).

Outdoor Living and Skills Series. Missouri Dept. of Conservation (P.O. Box 180, Jefferson City, MO 65102). Excellent activities for grades 1-6. Catalog of films and other teaching materials also available.

Project Learning Tree. American Forestry Institute and Western Association of Fish and Wildlife Agencies and the Western Regional Environmental Educational Council (Salina Star Rt., Boulder, CO 80302).

Project Wild. Western Association of Fish and Wildlife Agencies and the Western Regional Environmental Education Council (Salina Star Rt., Boulder, CO 80302).

Wildlife Habitat Conservation Teacher's Pacs. National Institute for Urban Wildlife, 10921 Trotting Ridge Way, Columbia, Maryland, 21044.

Computer Software

Minnesota Educational Computing Consortium (2520 Broadway Dr., St. Paul, MN 55113). Request list of software on wildlife management.

Nationwide Computer Products (P.O. Box 61, Morrissville, PA 19067). Request computer software list for environmental sciences.

Yaker Environmental Systems, Inc. (P.O. Box 18, Stanton, N.J. 08885). Request computer software list for environmental topics.

CHAPTER 7

Investigating Hunting

Topic Outline

- I. The Nature of Hunting
  - A. Hunting history in America
  - B. Reasons for Hunting
    - 1. Being outdoors
    - 2. Sport
    - 3. Companionship
    - 4. Getting back to nature
    - 5. Relaxation
  - C. Status of hunting today
    - 1. Viewpoint of national organizations
    - 2. Opinion survey
  - D. Nature of the hunting controversy
    - 1. The irrational nature of the controversy
    - 2. The non-hunter's position
    - 3. Personal responsibilities
    - 4. The landowner's point of view
- II. Hunter Safety
  - A. Firearm terminology
    - 1. Types of actions
    - 2. Parts of different firearms
  - B. Firearm handling
    - 1. Ten commandments
    - 2. Proper handling procedures
    - 3. Field behavior
  - C. Concepts of ballistics
    - 1. Types of shells
    - 2. Fundamentals of ballistics
  - D. Care of firearms
    - 1. Storage
    - 2. Maintenance
  - E. Marksmanship
    - 1. Sights
    - 2. Shooting technique
      - a. Pointing
      - b. Positions
      - c. Trigger squeeze
      - d. Lead
      - e. Swing
- III. Hunter Ethics
  - A. Ethics versus citizenship
    - 1. The meaning of sportsmanship
    - 2. Degrees of sportsmanship
    - 3. Developing ethics
  - B. Role of hunting ethics
    - 1. Anti-hunter sentiment
    - 2. Positive hunter actions
  - C. Developing responsible behavior
    - 1. Hunting responsibilities
    - 2. Developing habit
    - 3. Reinforcing ethical behavior
- IV. Hunting Skill
  - A. Pursuing game
    - 1. Specific technique considerations
      - a. Habitat
      - b. Time of day
      - c. Direction of pursuit
      - d. Type of pursuit (i.e., attracting, driving, stalking, etc.)

    2. Stalking techniques
    3. Attracting techniques
        a. Decoys
        b. Blinds
        c. Calls
        d. Scents
- B. Game care
    1. Equipment
    2. Technique
        a. Cleaning
        b. Transporting
        c. Storing
- C. Game utilization
    1. Cooking
    2. Trophies
- D. Developing personal satisfaction
    1. Enrichment project
    2. Keeping a journal

Introduction

The status of hunting in America is undergoing dramatic changes. Wildlife resources along with the privilege to hunt may soon disappear if hunters and non-hunters alike cannot unite to stop the most serious threat — the dramatic loss of wildlife habitat.

Hunting is part of our cultural heritage. The skills of pursuing and preparing wild game remind us of the true value of the meat on our table. And whether or not we accept the ideas of biological surplus and harvest, there will always be anti-hunter and anti-hunting sentiment. If hunters can understand the merits of opposing logic, and if non-hunters can realize the conservation and recreational values of hunting, policy compromises can be made which are acceptable to both groups and which will be of greater overall benefit to wildlife.

Curriculum Lesson Ideas

Topic I. The Nature of Hunting

OVERVIEW

The primary purpose here is to expose students to the hunter's world — to provide an opportunity for understanding the hunter's position and the problems he faces. Hopefully, those who *do* hunt will become more accountable for their behavior and those who do not hunt will be able to understand the total story behind the hunting position.

GENERAL BEHAVIORAL OBJECTIVES

The student will be able to:

Objective A: Regard hunting as a vital part of American history.

A-1 AMERICAN HUNTERS

Using reference material cited in the Reference List at the end of this chapter, have students report on famous hunters of the past. Include how and what they hunted. The famous mountain men, Ted Roosevelt, Herbert Hoover, Aldo Leopold, and James John Audubon are good examples.

A-2 HUNTERS AND CONSERVATION

Obtain the booklet "The Hunter and Conservation" from the National Shooting Sports Foundation, Inc. (address at end of chapter). Have students read it and identify the contributions hunters make to conservation (i.e. legislation, financial support, agencies and associations).

A-3 HUNTING'S EVOLUTION

Outline the different stages of hunting in America from survival, exploitation, commercial, to recreational. Fill in details on what might have caused such changes. Give examples.

A-4 THE "FOXFIRE" TECHNIQUE

Hunting, along with its cultural history, offers a fine topic for students to gather stories about. "Old-timers," experienced hunters, and interesting field situations from Game Wardens provide interesting reading for other community members. Students could interview such people for their reports. This is a great activity for English classes.

Objective B: Identify the variety of reasons for hunting.

B-1 THE QUESTIONNAIRE

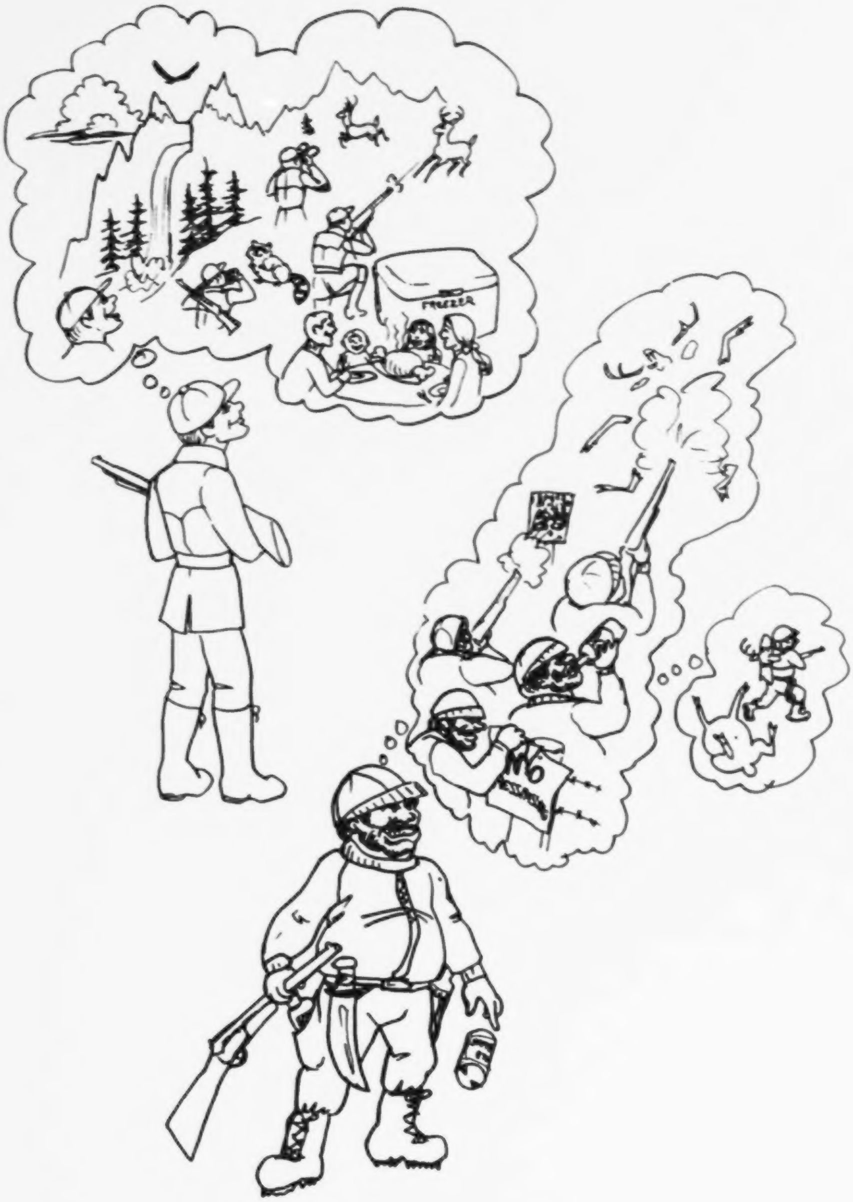
Develop and distribute a questionnaire to parents and local citizens asking them to identify their reasons for hunting or not hunting. You may want to leave the questionnaire at sporting goods stores, agencies, community centers and schools. Compile returns in class and discuss the varying viewpoints.

Be sure the study provides for open-ended questions so they can include any reasons you missed.

Questions may include: Do you hunt? Do you object to hunting? Do you feel hunting is a privilege? or a right? Does hunter behavior influence your opinion of hunting? Follow each question with "why or why not" to obtain the reasons for the respondent's answer.

B-2 THE RESPECTED HUNTER

Invite an experienced and respected hunter to class. Ask him to discuss the reasons he hunts. Also ask him to discuss problems facing hunters and how hunters might improve their situation.



FREEZER
NO TRESPASSING

With hunting, there should not be two ways about it!

Objective C: Recognize the status of hunting today.

C-1 WHAT THEY SAY

Obtain the film "What They Say About Hunting" from the National Shooting Sports Foundation. For each organization, have students guess what its policy statement might be. Compare the students' answers with those given in the film. There might be some unexpected remarks.

Objective D: Understand the nature of the hunting controversy.

D-1 GETTING TO THE ROOT OF THE ARGUMENT

Hunters and non-hunters alike should understand their reasoning for having certain opinions about the hunting issues. Understanding each other is the major step to working out solutions to a common problem — the fate of wildlife. For detailed instructions for this activity see page 107.

D-2 HUNTING'S A BLISTER; A SIMULATION GAME.

The purpose of this activity is to give students a chance to participate in the decision-making process. It also illustrates the consequences of negative hunter actions. See page 109.

D-3 IT GETS BACK TO YOU

This activity is designed to help students realize the direct and indirect consequences of unsportsmanlike conduct in the field. See page 112 for instructions.

D-4 THE LANDOWNER'S POINT OF VIEW

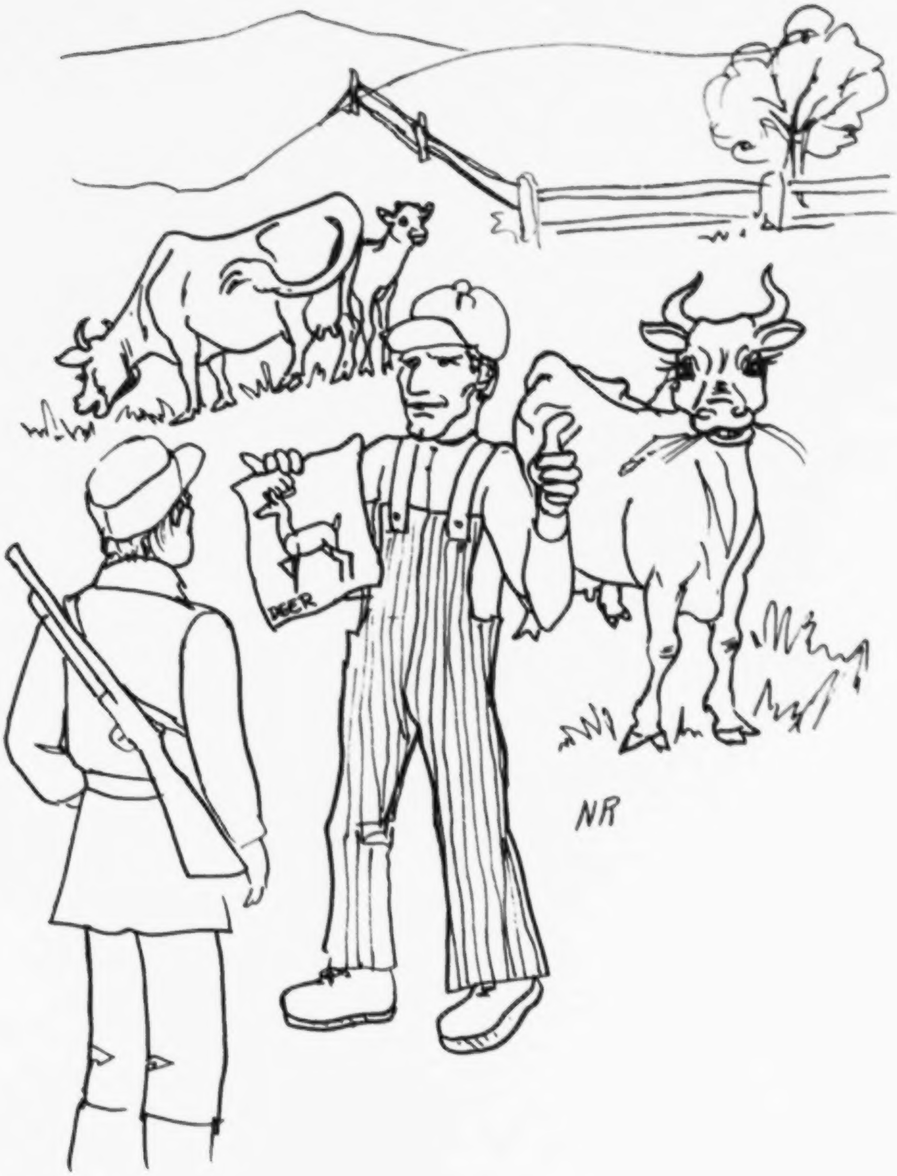
Invite a landowner to class. Ask him to give an approximate value of the various farm equipment, livestock and produce he owns. A prepared cost sheet would be handy for him to fill out. Also, ask him to assess the time involved with restoring damaged crops, equipment and property. Include time for herding animals which get loose. Use the form on page 113 for ideas. Students could also visit a farm/ranch hardware store to obtain prices for new items.

Ask him to discuss his opinions about hunters.

Follow up by taking a survey of closed lands in your area. Obtain a county map and key out areas which are closed entirely to, require permission for, or are open to hunting.

D-5 CONSIDERING THE LANDOWNER

This activity is designed to identify issues and conflicts which might occur when hunters try to gain access to private land. See page 115 for detailed instructions.



Landowners aren't always patient with uninformed hunters!

D-6 PRESENTING AN IMAGE

Label one side of the blackboard "good image" and the other side "poor image." Ask students to list characteristics which identify ethical outdoor use and present a good image of the hunter to the non-hunter. Contrast these with characteristics which represent improper outdoor use and a poor image. Referring to the lists, have students develop a definition of a "good image" hunter.

Topic II. Hunter Education

OVERVIEW

Hunter education programs are offered across the country through almost every state conservation department. Although this does not mean that every state produces safety-conscious or skilled sportsmen, such programs have proved effective in reducing firearm accidents.

A classroom situation, such as suggested here, offers an excellent opportunity to teach hunter education. A professional teacher certified to instruct hunter education, a well-planned teaching strategy over a longer period of time, and an internal evaluation scheme can often produce an improvement over traditional hunter education programs.

Instructor certification by itself is not enough. The teacher has a moral obligation to avoid the rubber stamp approach when it comes to student certification. We must demand that respectful and skillful behavior become an instinctive habit before any firearm certification is awarded.

It takes time, care and determination to do this job right. The end product will benefit us all.

APPROACH

Hunter education in school may be your greatest source of controversy. Consequently, the instructor must be well qualified and have his plans available far in advance. Needless to say, before any firearm use is permitted, students must be well aware of their responsibilities and have already developed good safety habits.

In addition to your state natural resource agency, several companies and organizations provide training materials, including BB guns and air rifles. (See Reference List at end of chapter.) This material should be on hand before you begin this topic.

The activities provided here are intended to supplement your standard hunter education manual. To entice enthusiasm, the teacher must be creative in his approach. Personal anecdotes and simulated situations are always useful. Getting students out into the field is a very important factor!

GENERAL BEHAVIORAL OBJECTIVES

The student will be able to:

Objective A: Understand firearm terminology.

A-1 THE GUN STORY

The history of firearms offers an interesting approach to learning the operating principles behind firearms. Using reference books cited in the Reference List, page 118 or standard encyclopedias, have students present reports on stages of firearm evolution. Perhaps diagrams of guns from different times would be useful. Any lecture or slide show about this topic is also worthwhile. Model guns are available in kits. Even an antique collection, if available, would provide an excellent vehicle for discussing and understanding gun terminology and operating principles.

A-2 DISSECTING CATALOGS

Probably the best way to become familiar with what's available on the market is to examine the market itself. Obtain catalogs from sources listed in references. Cut out examples of various types of firearms. Label parts and include a description of the operation and purpose of each.

From these pictures, blow up diagrams using an overhead projector and the chalk board. Hold contests for gun and part identification.

A-3 DISSECTING GUNS

Contact your local army reserve or national guard unit and ask for support in procuring inoperable firearms and firearms training aids. Be sure you make them inoperable and safe to handle.

Have your class dismantle these guns. Identify parts, their function and put them back together. You may want to contact a local gunsmith to do the same for you. Make a permanent demonstration board with exposed operable parts.

Objective B: Demonstrate proper firearm handling ability.

B-1 THE TEN COMMANDMENTS

Have students list their own ten commandments of firearm safety. After their lists are completed, mark their responses on the board. Compare these with the original ten commandments of the Hunter Education Manual. Discuss the meaning of each commandment.

As a followup, collect newspaper clippings of hunter/firearm-related accidents. Categorize these according to which commandment was broken.

B-2 HANDLING EXERCISE

Practice in the classroom the proper techniques for accepting weapons, including permission, checking the chamber, and holding positions. Test students on this habit by handing them a gun unexpectedly and saying "here." Check all firearms yourself and set the example.

B-3 A SIMULATED OBSTACLE COURSE

In the classroom, improvise a ditch, stream, fence, gate and a car with chairs, tape, string, etc. Demonstrate to students the proper techniques for carrying and transporting firearms, and zone of fire. Ask them to remove weapons from the "car," walk through the course with their partner, and return the weapon to the car. Make up check sheets to evaluate each student as he passes through each "station."

Do the same on a more realistic course outside. Use an actual car, fence, or ditch. Include real obstacles such as wet roots, fallen logs, and rocks.

B-4 THE HUNTING INTERN

After initial certification is earned, a "distinguished hunter award" might be given to those who demonstrate exceptional field behavior before an adult supervisor in the field.

Teachers could find experienced, concerned hunters in the community willing to act as hunting supervisors. These people would be responsible for taking a student hunting and completing a student evaluation form on actual field behavior. A training session would be advisable for both.

For volunteers, contact such groups as trap and skeet shooters clubs, rifle range clubs, and sport hunting clubs. It's handy to deal with outfits which already have facilities available.

Objective C: Understanding concepts of ballistics.

C-1 SPENT SHELL COLLECTION

Discuss the meaning of "caliber" and "gauge" and how these sizes are determined. Have students collect whatever shells they can from local shooting ranges, hunters, police, etc. Mount these on a display board and label them.

C-2 BALLISTICS STUDY

Using rocks as "bullets" and muscle as "powder," experiment by throwing rocks of different sizes, and at different distances, to see relationships between:

1. "Powder" and "bullet" size
2. Penetration and shocking power with different sized rocks thrown equal distances at an oil can. Measure can movement after direct hits to compare shock.
3. Trajectory of bullet path by comparing small, hard-thrown "bullets" to large, lobbed "bullets." Use a box as a target at 30 paces.

Be creative in drawing up this activity. Provide as many analogies as possible. Measure, record and discuss results in terms of hunting.

Objective D: Know how to store and maintain firearms.

D-1 WHERE TO KEEP FIREARMS

Provide students with a list of ways firearms are kept. Tell them to rank these ways in order of most dangerous to safest. For example:

1. Loaded gun in conspicuous open place
2. Loaded gun hidden in closet
3. Loaded gun locked in cabinet with key in it

4. Unloaded gun with ammunition nearby
5. Locked-up, unloaded gun with ammunition in separate place.

Discuss why No. 5 is the only correct way to store weapons.

D-2 HAPPINESS IS A SAFE GUN

Discuss with students the importance of keeping all firearms well maintained. Include safety, wear, cost, etc. Demonstrate to the class how to clean and maintain various weapons. Perhaps sponsor a clean up session after school where guns can be cleaned by students. Invite a gunsmith to class to demonstrate the techniques he uses to maintain weapons.

Objective E: Demonstrate ability in marksmanship.

E-1 RIGHT ON

Have students draw and label different types of sights on 3" x 5" note cards. Cut them out and attach them with pliable clay on the thin edge of a meter or yardstick. (Any straight stick or tube will do.) Explain proper sight alignment.

With the "gun" placed on the desk and the sights aimed at a fixed target, ask students to experiment by changing the position of the rear sight. Where would you hit if your rear sight is lowered? Raised? Moved to the left?

E-2 GUN INDOOR FIRING RANGE

By using a 4' x 8' x ½" sheet of plywood as backing with an old wrestling mat dropped over it for cushioning (a couple of army blankets will do), a range can be set up and operated safely in any average sized classroom.

Detailed directions for building and operating an indoor range are provided by the Daisy Manufacturing Co. (See Reference List for address.)

Both rifle and shotgun techniques can be tried by using BB guns. Consult your state's hunter safety manual or write to the National Rifle Association in Washington. The following should be covered: Aiming and pointing, sighting-in, positions, breathing, trigger squeeze, leading, and swing. Be sure the shooting team is well acquainted with safety and command procedures. Practice with known and consistent range factors.

E-3 THE BB SHOTGUN

Remove the front sight of your BB gun, tape the screw hole and, presto, you have a shotgun.

Using a ½ pint milk carton suspended from a string tied between two wooden stands and with a guide string tied to the supporting string, a student can swing the carton while he is well out of range.

The shooter can practice the "pull" command, his lead, and follow-through. Discuss and demonstrate the variations of this technique.

Topic III. Hunter Ethics

OVERVIEW

"Ethic" is defined as "a set of moral principles or values." When dealing with ethics, it becomes difficult to decide what *is* morally right, and it is even more difficult to assess the expected outcomes. Hence, we have the grand excuse for omitting our obligations to teach ethical sport behavior. For those of you who feel it's time to accept the obligation in hunter education we offer the following activities.

We believe that knowledge about wildlife and firearm safety is useless to conservation and the future of hunting if one does not accept the accompanying moral responsibilities. Ethics combined with knowledge and skills boil down to the essential element of sportsmanship — RESPECT.

APPROACH

Activities for developing student values take on unique characteristics. Teachers must maintain open minds. They must refrain from deciding what is "right" or "wrong." As soon as you cast your own values upon others, a barrier is created.

Within the past few years, educators developed a technique called "value clarification." This approach is based on exposing students to each other's point of view. With open discussion and idea exchange, understanding develops. Those who hold values which might be unacceptable to others are apt to change their values when exposed to the advantages of other values.

Objective A: Understand what is meant by "ethics" and "citizenship."

A-1 THE ABC'S OF SPORTSMANSHIP

Discuss with students the difference between "ethics" and "citizenship" ("ethics" conveys moral responsibility, whereas "citizenship" implies following the law). Both are important factors in sportsmanship. Ask them to provide examples of ethics and of citizenship.

Challenge teams of students to put together 24 examples of sportsmanship, each one starting with a different letter. Share the lists. Put together a master list which includes all the different ideas.

A-2 RANK AND ORDER

Provide students with statements representing different hunting behaviors. Allow students to rank each statement with a 1 for very ethical, 2 for moderately ethical, 3 for unethical. Discuss the results, noting differences in what individuals feel is ethical. For example, it may be unethical for a game warden to "ground shoot" a pheasant, while the same behavior might be ethical for a beginning hunter.

A-3 HOW ETHICS ARE DEVELOPED

Ask students to group and list the possible ways in which ethical hunting behavior is developed. Include: good teacher image, rewards from friends, knowledge and love of wildlife, reward from greater challenge, inner sense of sportsmanship, bad experiences, and others.

Each group should select one method, check with the teacher to assure that no one else has selected it, and with the other members act out a pantomine skit demonstrating how such learning might occur. Have other groups attempt to identify the method. Ensure a fun atmosphere by moving quickly and not forcing anyone to act.

A-4 LEGAL VS. ETHICAL

This activity allows students the opportunity to distinguish between legal and ethical behavior. Refer to activity "A Matter of Ethics," p. 116 for details.

A-5 GAME LAW VIOLATIONS

Contact your local conservation department for information regarding their "anti-poaching" program. Discuss with students the method of reporting game law violations.

A-6 INTERNATIONAL HUNTING SIGNS

List desirable and undesirable hunting behavior. Break into groups of two or three students, and have each team design an international sign illustrating one of the listed undesirable behaviors.

A-7 HUNTING REGULATIONS

Obtain the annual wildlife hunting regulation booklets from your state wildlife agency. Have students report on the regulations imposed on hunting certain species. Discuss who is responsible for making these regulations and why they are important.

Student role playing gets the point across.

Objectve B: Recognize the role of ethical hunting behavior in maintaining the future of sport hunting.

B-1 SLOBS — A SOURCE OF ANTI-HUNTER SENTIMENT

Using the same technique as in A-3 above, ask each student to act out an example of the kind of behavior to expect from the "Slob-Hunter."

Describe the consequences of such behavior, or use the "It Gets Back to You" activity as a follow-up. (See Activity Appendix.)

Discuss ways to minimize this type of behavior in the field. Suggest the N.R.A. program "Operation Respect" as one means, or giving a "violator" a "thumbs down" in the field as another.

B-2 GOOD DEEDS — STARTING THE ACTION

On the positive side of good sportsmanship, ask students how a hunter can "go one better" than what is expected of him. Include in your discussion the merits of such things as sharing game, cleaning up litter, going out of your way to be friendly, and assisting natural resource officers with their duties.

Your class can initiate the action among sports clubs and individual hunters by organizing a "hunter's good will" project. Start by finding out what local clubs and citizens are doing already. Follow-up by proposing and starting the action. Clean-ups, property repair, and habitat restoration projects are but a few ideas. Involve the media and resource agencies.

Objective C: Demonstrate ethical responsibility while in the field.

C-1 GUESS AGAIN

Often poor outdoor manners are the result of ignorance. For example, some inexperienced duck hunters do not realize the consequences of making lousy calls or wearing red hats. The idea here is to provide students with a variety of hunting situations where good outdoor manners are essential. Each student should analyze the situation and list the do's and don'ts of proper behavior.

Besides learning about good manners, good hunting techniques are also passed along. If you don't know them all, get an experienced hunter to fill in the details.

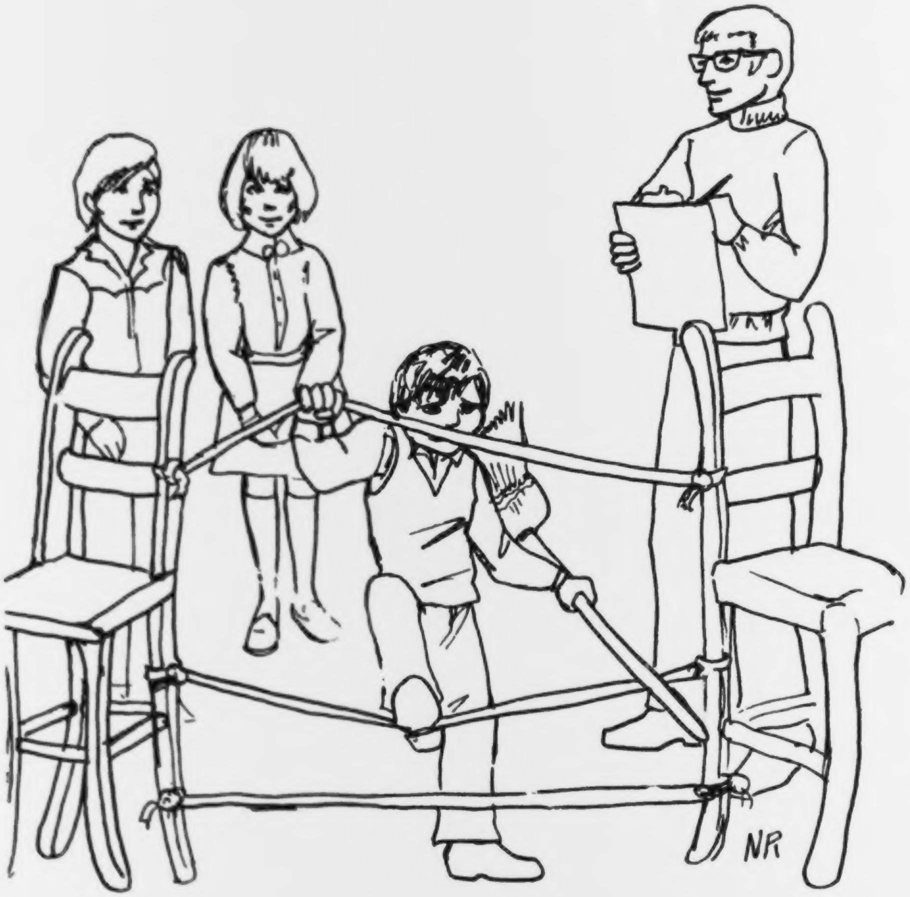
C-2 THE SELF-CONTROL TRAINING COURSE

Nothing short of experience will rid the beginner of "trigger-happy" tendencies. However, a walk-through course can be designed to simulate these "testing" situations. Good judgment comes with practice, especially with situations involving the "long shot," the "fast shot," sharing the shot, and instant target identification.

A field course with pop-up targets would be ideal. Large targets of both legal and illegal game species can be tacked on cardboard-backed wooden frames. With these frames hinged to a sturdy base, and with a pull cord attached to each, pop up targets as students walk through the course. To test the student's self control, the object would be to pass through the course with the lowest score possible. Points are added for improper identification, making dangerous moves, and the like. Points are subtracted for making good "shots" in the least amount of time. A standard air gun could be used to simulate firearms.

C-3 THE TEST

Although seldom thought of as an activity, the pre-test and post-test approach is a useful teaching mechanism. Often, teachers and students fail to realize how much progress was made, if any, at the end of the course.



This is where making mistakes can actually be of benefit.

Rather than announcing the test beforehand, give students a "teacher's test" at the end of the course. Ask them specific questions relating to ethical behavior. They should cite examples of good conduct in the field for various sport situations. Make it creative and interesting, and by all means, go over it in class and use it as a *teaching tool.*

Topic IV. Hunting Skills

OVERVIEW

There is a direct correlation between a successful hunter and a responsible hunter, and development in both these areas is probably concurrent. Therefore, if we expect good sportsmanship as a final product of our teaching efforts, we must introduce the students to those hunting skills which will increase his or her chances of success in the field.

APPROACH

All the "tricks" of the trade take years to master, and masters are hard to come by. The teacher, if not a master, must then serve as a motivator and facilitator. Knowing all the answers is a gift. Knowing the sources of answers takes work but offers higher dividends in that both teacher and student learn together.

A well-stocked vertical file is invaluable, especially when the majority of localized hunting skill information is found in magazines and newspapers. The books cited in the Reference List are also excellent. They will serve greater utility, though, when chapters are paraphrased or outlined on notecards. Start working now on building that resource file. It will provide for a more interesting and dynamic unit. Besides, you may pick up a couple of pointers your missed along the way.

GENERAL BEHAVIORAL OBJECTIVES

The student will be able to:

Objective A: Demonstrate self-reliance in pursuing game.

A-1 THE TIDBITS

Using reference material concerning the wildlife present in your region, have students assemble any and all "tidbits" associated with a particular species of interest. This could include a footprint plaster cast; actual food samples; additional sign, such as scat, fur, or gnawed bark; a range map; habit details; and other related information.

This might be more effective as a group project during field trips or weekend excursions.

A-2 THE RESOURCE FILE

If outdoor excursions are impossible, have students collect "tidbits" by using reference materials instead of actual items. Again, have teams group together to dig this information out from your well-stocked resource library.

Learning how animals behave can prove interesting.

After presenting each wildlife card, discuss the best technique for approaching the animals. Include: time of day, direction, type of pursuit (sitting, driving, tracking, etc.), and habitat.

A-3 STALKING THE WILD AARDVARK

After students have been directed to the resources and techniques have been discussed, have each student stalk any wild animal of his choice with a camera. A log should be kept as to species habitat and the technique used for stalking. In addition, have students circle target areas on their photos.

A-4 THE PROFESSIONAL

Invite a wildlife professional to your class. Ask him questions on the best techniques for approaching wild animals. Record the session and use this information later.

A-5 BUILDING MODELS

Successful duck hunting (as well as other types of hunting) depends upon understanding the standard principles involved.

Using papier-mache or other material, build, for example, the duck hunter's "set-up." Include a model blind, decoy positioning, and wind direction on a lake.

Do the same for a deer ridge drive, and other situations.

A-6 A RETRIEVER DEMONSTRATION

Contact a hunting or kennel club and ask them to demonstrate how dogs respond to actions and sounds in the field.

Objective B: Demonstrate self-reliance in game care.

B-1 THE HUNTER'S PACK

Advance preparation is not only necessary for proper game care, but also for survival and comfort. Have students list every item to be included in the hunter's pack. Provide reference material as a source to check their lists against.

Bring equipment to class and demonstrate its proper use. Your local hunting supply store is usually more than willing to volunteer their equipment and personnel for classroom presentation. (It's good public relations.)

B-2 THE GAME CARE SLIDE SHOW

If the opportunity arises, use a successful hunter as a movie star. (He'll be flattered!) Involving the students, take a sequence of slides showing the step-by-step process of game preparation and transportation. Remember, not everyone visualizes that bloodied, sad-looking deer carcass that's draped over a car hood as a beautiful trophy.

The same technique can be used for skinning, tanning and taxidermy. With these activities, effective results depend upon good visual aides and practice.

Objective C: Demonstrate self-reliance in utilizing wild game properly.

C-1 DINNER FOR TWO AND RESOURCES TOO?

As a pre-activity assignment, ask students to collect an assortment of recipes for wild game common to your region, using home recipe books, reference material and first-hand experience.

At the close of hunting season, gather wild game from successful generous hunters. Be sure you know the meat is safe for consumption. Discuss and list the precautions to be taken with certain game meat. What diseases are transferable through game animals?

Have students prepare a wild game dinner. If first results are good (with no casualties!), offer another dinner. This time ask for contributions. If they are interested in the delicacies savored, then sell them your recipe book. All proceeds and equipment can go toward your Outdoor Sportsmanship Resource Center.

C-2 THE NOVICE TAXIDERMIST

This interesting subject is a winner for a classroom activity. The best approach involves working closely with an experienced taxidermist. Visit his shop to study the process. A museum of natural history or a local university can also probably offer experts in this area.

Select your animals wisely, being careful not to handle animals whose cause of death is unknown. It is also important that you check with your state wildlife conservation agency to find out which birds and mammals have restrictions concerning their capture for purposes of obtaining their feathers, furs, etc. Except for a few game mammals and birds, it is *illegal* to possess nests, feathers, eggs, and skins. Avoid possible embarrassing situations; be sure you are legal!

Consult the Reference List for written material.

C-3 NOT THE CANDLESTICK MAKER

Every community has experienced butchers. Invite one to class for a discussion on proper butchering techniques. Videotaping is also a good way to bring the butcher shop to class.

Objective D: Identify ways of gaining personal satisfaction out of the sport of hunting.

D-1 ENRICHMENT PROJECTS

Students may want to select long-term independent "craft" projects. Using reference material such as "Sports Afield" and "Field and Stream," they might consider such projects as making decoys or an elk whistle, building a blind, or refinishing a rifle stock.

D-2 THE WILDLIFE JOURNAL

A personal record of notes relating certain experiences with wildlife, hunters, or hunting stories and the like, offers a valuable method of preserving a student's rare experiences.

Note to the teacher:

Following completion of the activities in this chapter, students should be able to develop their own ethics list similar to the one provided below.

Hunting ethics

Hunters and other outdoor recreationists realize that the protection of our environment and its wildlife is enhanced by the ethical conduct of its users. Listed below are some tips to keep in mind while hunting.

1. **I will consider myself an invited guest of the landowner, seeking his permission, and so conducting myself that I may be welcome in the future.**
2. **I will obey the rules of safe gun handling and will courteously but firmly insist that others who hunt with me do the same.**
3. **I will obey all game laws and regulations, and will insist that my companions do likewise.**
4. **I will do my best to acquire those marksmanship and hunting skills which assure clean, sportsmanslike kills.**
5. **I will support conservation efforts which can assure good hunting for future generations of America.**
6. **I will pass along to younger hunters the attitudes and skills essential to a true outdoor sportsman.**

The National Rifle Association

Activity D-1
Investigating Hunting, Topic I, D-1
GETTING TO THE ROOT OF AN ARGUMENT

Time: 45 Minutes

Purpose: Many argue for or against a particular type of social activity without clearly understanding the nature of either position. Underlying or hidden feelings often lead to emotional or defensive reactions to another opposing view.

This activity is designed to identify the variety of reasons in support of or against hunting; to allow each individual to understand his or her feelings about hunting; and to then discuss openly their positions in terms of concrete supportive rationale.

The goal is to foster within each student an understanding of opposing points of view and to develop within each individual the ability to express his or her position in an effective manner.

Materials: Blackboard or overhead projector.

Pre-Activity: Introduce students to the nature of irrational and emotive arguments by using the "Devil's Advocate" technique. That is, propose an argumentative statement, such as, "students should not be treated as responsible young adults until they reach the age of twenty." Attempt to justify your position with a few scandalous remarks to elicit their emotive responses.

Sit back and let them defend their position. Stop the action at its hottest moment. . .then introduce the purpose of this activity.

Procedure:

1. Determine Reasons
   a. Ask the students, via a show of hands, for those who are "pro" hunting and for those "anti" hunting.
   b. Explain to them that either position is common within society today. Continue by adding that each position is usually based on good reasons. Include that some people have mixed emotions, that is, are undecided or caught in between.
   c. Put students in groups of five or six, each group to be pro or con. Have each group write down any reason it can think of that either supports or is against hunting. After three or four minutes, ask each group to present some of its reasons. Categorize them on the overhead projector or blackboard under "pro" or "con" reasons.

This activity is especially effective if each group is made up of pros, cons and neutrals. It will force some to think of others views.

   d. Continue with the listing until you have exhausted every different reason thought of. Do not over-kill the point though!

2. Order and Compare
   a. After the lists are as complete as possible, again ask students to rank these reasons on paper with their most preferred reason as number one. Five reasons should be enough.
   b. Allow three to five minutes for students to compare lists with one another. By show of hand, rank these on the blackboard.
3. Justification
   a. After each reason on their list, ask the students to think back in time. Ask them to try to remember *why* they might support the reasons they ranked. Perhaps they can remember the circumstances, either with family, friends, or their own individual experience, that may reflect their selections.
   b. Allow them to jot down a word or two after each that reminds them of their rationale. In other words, what past events in their lives established this feeling.
   c. Ask them to volunteer their rationale. Utilize this as a basis for discussion as to why arguments over hunting can get so heated. Emphasize the fact that neither position is wrong based on what an individual feels or understands.

Conclusion:

Follow-Up Questions
1. What are the problems usually associated with arguments like this one?
2. List three examples of other arguments that created problems such as this.
3. How can one avoid getting involved in an emotional or irrational argument?

Questions for further thought
1. What is the basis of the hunting controversy?
2. Do you think the hunting controversy will ever be resolved? Why or why not? If so, how might it be?
3. Why do emotional or irrational arguments over hunting further complicate the problem?
4. How do you think we could reach a compromise regarding the hunting controversy?

Activity D-2

Investigating Hunting, Topic I, D-2

HUNTING'S A BLISTER; A SIMULATION GAME

Time: 45 minutes

Materials: Classroom arranged to simulate town hearing. Enlarged map of Blister County.

Purpose: Clarifying values involves putting yourself into another person's shoes. It's unlikely that highly controversial issues will ever be resolved through argument and emotionalism. The task is to identify the essence of conflict and seek solutions in a rational manner.

This activity allows students to characterize "typical" viewpoints concerning hunting behavior. The simulation is modeled after a realistic situation in which students might someday be involved. The objectives include understanding a community's decision-making process, clarifying elements of common issues, and identifying the possible consequences of unsportsmanlike behavior.

Pre-Activity:

1. Read to the class the "background information sheet" concerning the town council meeting. Modify the situation to add greater reality if needed.
2. Divide the class into three groups: the town council, the testifying citizens, and the citizens attending.
3. Select a town council chairperson to oversee the hearing.
4. Allow the testifying citizens to pick a personality which they feel comfortable imitating. These witnesses should be evenly divided between "preservationists" and "sportsmen." Use the list provided or make up your characters.

"Hunting's a Blister" — A Simulation Game

BACKGROUND INFORMATION SHEET

You are a group of concerned citizens meeting before the town council of the medium-sized community of Blister. Blister's primary source of income is tourism. Commercial enterprises include grocery stores, novelty shops, sporting goods stores, dude ranches, rest homes, and guide and outfitter organizations. There are several community organizations including a rod and gun club, a Sierra Club and an Audubon Society.

A controversial situation has recently developed concerning the changing of the nearby Sky High National Forest to Sky High National Park. This development has been considered for several years by the National Park Service but recently received special attention through the petitioning efforts of citizen groups of Blister County. Their views concern preservation of wildlife, public and private property welfare, and safety. The sportsmen of the community, feeling these interests are completely unfounded, are ready to fight the park's establishment to the end.

The town of Blister is ready to explode. Feelings are intense because the decision is to be made tonight following testimonies heard from attending citizens.

You are one of these citizens representing the interest implied by your name. Each testimony will be limited to two minutes. It is advisable that you refrain from profane comments or direct insults if you can. Please support your viewpoints with facts and actual experiences if possible. Be brief and to the point.

CHARACTER DESCRIPTION LIST — FILL IN AFTER EACH ONE

Preservationists	**Sportsmen**
Sara Cleanspot	Hank Killroy
Bill Naturewonder	Bob Careless
Iris Flutternut	Suzie Knownot
Ken Gunshy	Walt Concerned
Wilma Leavitalone	Flo Fearless
Louie Louser	Chip Knowall

The character of these individuals is implied by their names. You are to select a character of your choice. It is better if you know what their points of view might be. To add a touch of reality to the situation, write down a brief character description of yourself, including some hunting experiences you've had.

"Hunting's a Blister"

Procedure:

1. Each testifying citizen should write down a brief character description which typifies their name. For example: Walt Concerned is a sportsman who is very conscientious about his behavior in the field. He feels the criticism hunters receive is unjust and unwarranted. His testimony will be based on the benefits provided in terms of tourist business and license fees.
2. After completing these character descriptions, the hearing should begin. The town council chairperson introduces the controversy and describes the purpose of the meeting.
3. After alternating testimony between "preservationists" and "sportsmen," the chairperson opens the discussion to the floor.
4. With no futher comment, the council will vote and deliver its decision.

Conclusion:

1. Allow the total class to vote on the issue. Was the majority decision the same as the council's?

2. Ask each council member to describe why they voted the way they did.
3. Did you feel the meeting was realistic? What were its good points? What were the bad points?
4. Would there have been a possibility to compromise the controversy? Explain.
5. Can you think of other factors besides hunting that might lead to a controversy such as this? Explain.
6. How might we prevent such problems from arising?

Activity D-3
Investigating Hunting, Topic I, D-3
IT GETS BACK TO YOU

Time: 30 minutes

Materials: Pencil and paper
Overhead projector or chalk board

Purpose: If every sportsman realized the ultimate consequences of unsportsmanlike conduct, he would give careful thought to his actions in the field.

The objectives of this lesson include:
To identify unsportsmanlike behavior
To understand results from negative actions
To learn to think more carefully before acting

Pre-Activity: Assign two or three students to a specific hunting situation as listed below or create your own.

1. Exceeding your limit of ducks on opening day
2. "Chasing down" a deer with a snowmobile
3. Leaving a mess at your last hunting campsite
4. Killing and leaving a doe in a "bucks only" area
5. Shooting up road signs
6. Taking several wild shots at out-of-range targets
7. Insisting that a dead elk is yours when you did not even shoot
8. Forgetting to close a gate. The cows get lost
9. Tramping down a farmer's corn field while pheasant hunting
10. Mistaking a fellow hunter for a deer

Procedure:

1. Ask the students to create a hypothetical chain of events
2. These events must follow a reasonable sequence which ultimately will affect the original offender
   Example: Duck hunter making poor duck calls, other duck hunters skybusting, several winged ducks, poor duck hunting in the area, added pressure from anti-hunter, limited duck season next year
3. Allow each student to describe his "chain of events" to the class

Conclusion:

1. What types of mistakes create the quickest negative results? Why?
2. Which mistakes affect the greatest number of people? Why?
3. Explain why the statement "getting away with something" is not very often true when it involves unsportsmanlike conduct.

Sample Form for Activity D-4
Investigating Hunting, Topic I, D-4
THE LANDOWNER'S POINT OF VIEW

Property Values:

Invite a farmer to meet with your class and give you the values of the following items:

Tractor tire front.........$________
Tractor tire rear..........$________
Tractor headlight..........$________
Mail box................$________
Metal fence post..........$________
Treated wood fence post...$________
1 roll barbed wire (____ft.).$________
1 roll woven wire (____ft.).$________
One mile of new fence
(3 strands barbed wire
on wood posts).........$________
Man-hours of labor
to build fence..........$________
Man-hours of labor
to repair 1 mile of
older fence............$________
Electric fence control
box/battery............$________
Windmill pump w/ rotor..$________
Deep well irrigation pump.$________
Electric pole/line insulator.$________

Livestock:
Pure bred dairy calf
new..................$________
6 weeks................$________
6 months...............$________
fresh cow..............$________
Yearling pure bred Angus
heifer..................________
steer..................$________
Sheep
ewe...................$________
lamb..................$________
ram...................$________
Domestic turkey..........$________
Domestic goose..........$________
Horse..................$________

Bale of hay..............$________
Bushel of wheat..........$________
100 lbs. shelled
yellow corn.............$________

On a class field trip, select a five-mile stretch of county road, and count all the signs posted on the right-of-way.................. ________

Contact your county road department for costs as follows:

What is the value of a standard "STOP" sign on metal?.............$________

On fiberglass...$________

What is the value of a standard "YIELD" sign on metal?............$________

On fiberglass...$________

These are signs that all sportsmen take the blame for!

Activity D-5

Investigating Hunting, Topic I, D-5

CONSIDERING THE LANDOWNER

Time:	10 minutes
Purpose:	Many of our outdoor activities take place on privately owned lands. Often sportsmen are refused access to posted lands because of the thoughtless actions of a few individuals. This simulation activity is designed to identify issues and conflicts which might occur when sportsmen try to gain access to private lands.
Procedure:	Ask for two volunteers and have them act out the following situation in front of the class or divide them into pairs and have each pair role play the situation.

One person is a farmer and the other a hunter. The farmer has land suitable for hunting. His land is posted because in the past fishermen, backpackers, picnickers and hunters came onto his land without permission. They left trash, damaged fences, harmed crops and disturbed livestock. The hunter will ask for permission to hunt on the farmer's land.

Allow five minutes to try and resolve the issue. At the end of five minutes, discuss what happened. Was the issue resolved? Why or why not?

*adapted from "Considering the Landowner," S.P.O.R.T. program, Missouri Department of Conservation.

Activity A-4
Investigating Hunting, Topic III, A-4
A MATTER OF ETHICS

Time: 20 minutes

Purpose: To distinguish between legal and ethical behavior.

Pre-activity discussion: Legal can be defined as judging behavior as right or wrong based on a set of written laws. Ethical, on the other hand, is judging behavior as being right or wrong based on a set of moral values. A legal judgment is clearly defined as right or wrong, but an ethical judgment is based on values which may vary from one individual to another.

Some activites may be legal and yet considered unethical. An example might be shooting into a covey of quail on the ground. Another might be shooting ducks on the water or making undue noise near a fisherman.

Procedure: Read the following situation aloud to the class.

Jim, Ben, Harold and Tom live in the same county. They all grew up together and went to the same high school in their small community. As high school students they learned to hunt and since becoming adults they have continued the sport. How and why they hunt differ, however.

Jim has five children and has had trouble finding a steady job. He admits that he sometimes takes game out of season or more than his limit, but he needs food for his family. Times are rough, he says, and a man has to feed his family however he can.

Ben was very competitive in school and prides himself in always doing better than anyone else. He loves to hunt but he always wants the biggest and the most. He frequently brags that he always takes his limit. What he doesn't need he leaves in the field, throws away, gives to friends or sometimes sells.

Harold lives in an expensive home and drives an expensive car. He has many debts. Although he has a good job, he's always looking for a way to make extra money. What he shoots he usually sells. Harold doesn't pay much attention to legal seasons. His philosophy is just not to get caught.

Tom owns a farm in the county. He has had continual problems with deer eating his corn. He has contacted the Conservation Department and received suggestions of what to do, but he still feels that deer are overabundant and pests that need to be destroyed. He spotlights deer whenever he can, shoots them, and throws them into a ditch. He says every deer he kills is one less deer to eat his valuable crops.

Divide the class into groups of five or six. Though the actions of all men are illegal, have the groups discuss whether their behavior is ethical or unethical. Have each group rank the men's behavior. Allow 10 minutes.

Call time after 10 minutes. Write the men's names on the blackboard. Ask each group to tell how the characters ranked and list the rankings after each name. Did the groups agree on whether or not the men acted ethically or unethically? Did their rankings agree or disagree? Did any character rank consistently the same? Have groups defend their choices. Point out that ethical judgments are based on values and individuals have different value systems. Therefore, there may be no right or wrong answer.

*activity written by the Missouri Department of Conservation.

Reference List — Hunting

Books

Basic Hunter's Guide. National Rifle Association, Washington, D.C. 1982. Covers ethics, wildlife management, game identification, equipment, field care of meat, survival, first aid, and legal responsibilities.

Bowhunting Deer. National Bowhunter Education Foundation (Rt. 6, Box 199, Murray, KY 42071). Covers bowhunting fundamentals, instruction and equipment, when, where, and how to hit your deer, and more.

Conservation Directory, annual publication of the National Wildlife Federation (1412 Sixteenth St., N.W., Washington, D.C. 20036) which lists most federal and state conservation agencies and organizations. This is a good source of addresses for these agencies.

The Deer Hunter's Guide. Francis E. Sell, Stackpole, Harrisburg, PA. 1964.

Ducks at a Distance. Outdoor Empire Publishing, Inc. (511 Eastlake Ave., E., Seattle, WA 98109). Waterfowl identification guide showing how to recognize different species by their plumage color, flock pattern, silhouettes, and sounds.

Game Cookbook. 2nd Ed. Geraldine Steindler, Stoeger Publishing Co., Hackensack, N.J. Recipes for the at-home gourmet.

Get Set to Trap. Outdoor Empire Publishing, Inc. (511 Eastlake Ave. E., Seattle, WA 98109). Developed for use in hunter education classes, this workbook-text presents trapping from its heyday in the 1600s to its role in conservation today.

How to Start a Shooting Sports Program. Remington Arms Co., Inc. (Box 1939, Bridgeport, CT 06601). Explains how to set up a shooting sports program or plan a shooting event, giving guidelines for shooting games.

Hunter Safety and Conservation. National Rifle Association — Hunter Services Division (1600 Rhode Island Ave., N.W., Washington, D.C. 20036). Covers basic hunting principles, firearms, bowhunting, first aid and survival, ethics, game care, and more.

Hunter Safety Handbook. Outdoor Empire Publishing, Inc. (511 Eastlake Ave. E., Seattle, WA 98109). Available in student and instructor editions for use in hunter education programs. Explains hunting fundamentals, firearms, bowhunting, first aid, survival, ethics, and game care.

The Hunter's Field Guide to the Game Birds and Animals of North America. Robert Elman, Knopf, N.Y. 1982.

Knife Know-How. Buck Knives, Inc. (P.O. Box 1267, El Cajon, CA 92022). This 14-page booklet includes basic history of the development of the knife, how to select and sharpen a Buck knife, how to use it to dress a deer or skin and filet a fish, and basic do's and don'ts about knives.

Shooter's Bible. 1985 Edition. William S. Jarrett (Ed.), Stoeger, N.J. 1985.

Wild Game from Field to Table. National Rifle Association — Hunter Services Division (1600 Rhode Island Ave. N.W., Washington, D.C. 20036). Twelve-panel brochure covering field care for small and big game, transporting game and processing meat. Several recipes are included also.

Magazines

Your State Wildlife Conservation Agency Magazine. Request subscription for your school.

Hunter Safety News. 511 Eastlake Avenue E., Seattle, WA 98109. Bimonthly. In every issue: newest training aids and trends in hunter education, teaching methods that get results.

Organizations, Associations, etc.

Your State Wildlife Conservation Agency. Request list of available films, booklets and pamphlets.

Alan Madison Productions, Inc. (Red Rock Rd., P.O. Box 100, Chatham, NY 12037). Ask for list of films on hunting.

Bear Archery (Rural Route 4, 4600 S.W. 41st Blvd., Gainesville, FL 32601). Request booklets "ABC's of Archery" and "ABC's of Bowhunting."

Crosman Air Guns (A Coleman Division, Rts. 5 & 20, East Bloomfield, NY 14443). Request the many booklets, pamphlets and posters on safety, marksmanship, training and teaching materials.

Daisy Manufacturing Co. (Special Market Programs, P.O. Box 220, Rogers, AR 72756-0220). Ask for booklets "Quick Skill Shooting" and "Shooting Education," and films on airgun shooting, marksmanship and competitions.

Ducks Unlimited, Inc. (P.O. Box 66300, Chicago, IL 60666.) Request information on the "Greenwing Program" and film list.

Federal Cartridge Corporation (2700 Foshay Tower, Minneapolis, MN 55402). Write for pamphlet "Training Aids for Hunter Education and Other Youth Shooting Sports Classes." Film list also available.

Izaak Walton League of America (Suite 1100, 1701 N. Fort Myer Dr., Arlington, VA 22209). Request pamphlets on hunter ethics and outdoor behavior.

L.L. Bean (Freeport, ME 04033). Write for free catalog of hunting equipment, clothing and footwear.

3M Co. (3M Center, Building 220-7W-02, St. Paul, MN 55144). Request list of videos and teaching material on hunting.

Missouri Dept. of Conservation (Outdoor Skills Education Unit, P.O. Box 180, Jefferson City, MO 65102-0180). Ask for brochure on their "Outdoor Skills Education" program.

National Bowhunter Education (Route 6, Box 199, Murray, KY 42071). Their catalog lists many useful books, booklets and visual training aids.

National Rifle Association (Hunter Services Division, 1600 Rhode Island Ave., N.W., Washington, D.C. 20036). Write for "NRA Standard Order Form" and "NRA Hunter Services Materials Price List" which includes prices for brochures and hunter education, clinic and competition materials. Film list also available.

National Shooting Sports Foundation (P.O. Box 1075, Riverside, CT 06878). Request pamphlet "Promotional Literature" containing descriptions of their booklets, posters, films, filmstrips, patches, pens and stickers.

National Trappers Association, Inc. (P.O. Box 3667, Bloomington, IL 61701). Provide booklets and pamphlets on trapping, the trapping controversy and the role of trapping in wildlife conservation.

Outdoor Empire Publishing, Inc. (511 Eastlake Ave. East, P.O. Box C-19000, Seattle, WA 98109). Ask for pamphlet on hunter safety education teaching materials and publications.

Remington Arms Co., Inc. (Box 1939, Bridgeport, CT 06601). Request list of available books and films on skeet shooting, starting a shooting sports program, and general hunting.

Sporting Arms and Ammunition Manufacturer's Institute, Inc. (1075 Post Rd., Riverside, CT 06878). "Firearms Safety Series" brochure and order form available.

U.S. Jaycees. Shooting Education, P.O. Box 7, Tulsa, OK 74121. Ask for information on local, state and national airgun competitions.

Wildlife Management Institute. (1101 Fourteenth St., Suite 725, Washington, D.C. 20005). Request pamphlet on "Improving Access to Private Land."

Woodstream (P.O. Box 327, Lititz, PA 17543). Request brochures, films and teaching materials on trapping and its role in wildlife conservation.

Local Sporting Goods Stores. Videos, films, booklets and pamphlets available.

Board Games

Duck Hunter. Players learn waterfowl identification, hunter ethics and responsibility as they go on a "hunt." Order from Vista, Inc., 725 Cowper St., Palo Alto, CA 94301.

Other Teaching Packages

Advanced Hunter Education and Shooting Sports Responsibility. National Wildlife Federation (1412 Sixteenth St., N.W., Washington, D.C. 20036). Lesson plans, references and activities cover hunting, firearm safety, types of firearms, hunting in wildlife conservation, ethics, advanced hunting methods, and more.

Hunter Responsibility. Colorado Division of Wildlife (6060 Broadway, Denver, CO 80261). Contains activities on hunter ethics and the hunting controversy.

Shooting Education. Daisy Manufacturing Co. (P.O. Box 220, Rogers, AR 72756). Ten-lesson curriculum designed to instruct young shooters in the skills of proper gun handling and marksmanship.

S.P.O.R.T. Ethics Class. Missouri Dept. of Conservation (P.O. Box 180, Jefferson City, MO 65102-0180). Excellent activities, lesson plans, tests, references, etc. on shooting sports.

Courses

Hunter Education for Instructors (FW 355). Colorado State University Correspondence Course. (Div. of Continuing Education, C102 Rockwell Hall, Colorado State University, Ft. Collins, CO 80523). Provides training and encourages hunter education instructors to provide high quality learning experiences by demonstrating knowledge of the learning processes; effective teaching behaviors; and knowledge, skill and ethics associated with hunting.

Orvis Shooting Responsibility School. Orvis Co., Inc. (Manchester, VT 05254). Three-day session covers shooting skills, safety, gun maintenance, and simulated quail hunts. Equipment and room and board are provided.

Teaching Shooting Responsibility (FW 350). Dept. of Fishery and Wildlife Biology (Colorado State University, Ft. Collins, CO 80523). Education and instructor certification course to develop knowledge, skills and behavior for teaching firearms, shooting sports and associated ethics.

CHAPTER 8

Investigating Fishing

Topic Outline

- I. Nature of Fish
  - A. Fish ecology
  - B. Anatomy
  - C. Species
    - 1. Warm water
    - 2. Cold water
  - D. Fish habits

- Fisheries Management
  - A. Problems
    - 1. Pollution
    - 2. Disease
    - 3. Overcrowding
  - B. Management
    - 1. Hatcheries and stocking
    - 2. Habitat improvement
    - 3. "Quality" fishing areas
    - 4. Laws and regulations
    - 5. Research

- III. Fishing Technique
  - A. Types of reels
    - 1. Bait casting
    - 2. Spin casting
    - 3. Spinning
    - 4. Fly casting
  - B. Rigging
    - 1. Balanced tackle
    - 2. Hooks
    - 3. Lines
    - 4. Knots
  - C. Baits
    - 1. Natural
      - a. Finding
      - b. Rigging
      - c. Fishing
    - 2. Artificial
      - a. Types
      - b. Making
      - c. Using
  - D. Where to fish
    - 1. Lakes and ponds
    - 2. Streams
  - E. How to fish
    - 1. Casting
      - a. Single haul
      - b. Double haul
    - 2. Fighting fish
      - a. Hook setting
      - b. Playing fish
      - c. Pumping in line
      - d. Drag adjustment
      - e. Landing the fish
  - F. Catch and release
  - G. Fishing safety
    - 1. Hook first aid
    - 2. Walking and wading
    - 3. Casting safety
    - 4. Boat and water safety
  - H. Preparing fish
    - 1. Transporting
    - 2. Cleaning
    - 3. Cooking

- IV. Fishing Etiquette
  - A. Quality fishing
  - B. Ethical behavior

INTRODUCTION

Fishing is probably the country's most popular field sport, and yet, many of us do not realize what fishing is all about.

Besides the obvious skills associated with "landing the big one," an avid sport fisherman possesses many other qualities, like patience, courtesy, outdoor wisdom, self-restraint, resourcefulness, meditation, and of course, story telling. Not many sports can claim such an array of characteristics and even fewer require as little initial investment in equipment.

A beginner's "luck" often sets the foundation for lifetime attitudes and interests toward fishing. The purpose here is to provide an outline of activities which form the basis of pleasurable fishing recreation. If teachers can generate student enthusiasm for learning fundamental fishing principles, we may not only accomplish what every biology or ecology course attempts to do, but may substantially change the student's "luck" factor to self-satisfying know-how. Hopefully, such an approach will result in more true sport fishermen and good outdoor citizens.

Curriculum Lesson Ideas

Topic I. The Nature of Fish

OVERVIEW

Even years of experience will not guarantee expertise in angling. Rather than detailing instructions in technique, the activities below suggest ways to deliver elementary concepts effectively. The underlying principle involves understanding of fish habits and being able to accurately imitate their food using rod, reel and lure. As with ecology, good fishing technique depends largely on maintaining balance.

GENERAL BEHAVIORAL OBJECTIVES

The student will be able to:

Objective A: Understand fundamental relationships in water ecology.

1-A AQUATIC FOOD CHAINS

Either by sifting, grabbing or by fishing, have students collect examples of primary producers and of first, second and third order consumers.

Impose the ethic of returning these organisms to the system alive after recording such information as its name (use reference books), adaptations, and habitat. Draw these critters in food chain fashion; perhaps continue to connect a food web.

It is important that you check with your state wildlife agency concerning restrictions on collecting and possessing aquatic animals, including fish. Avoid embarrassing situations, make sure you are legal. Educational permits may be available.

A-2 FOOD CHAINS AND THE FISHERMAN

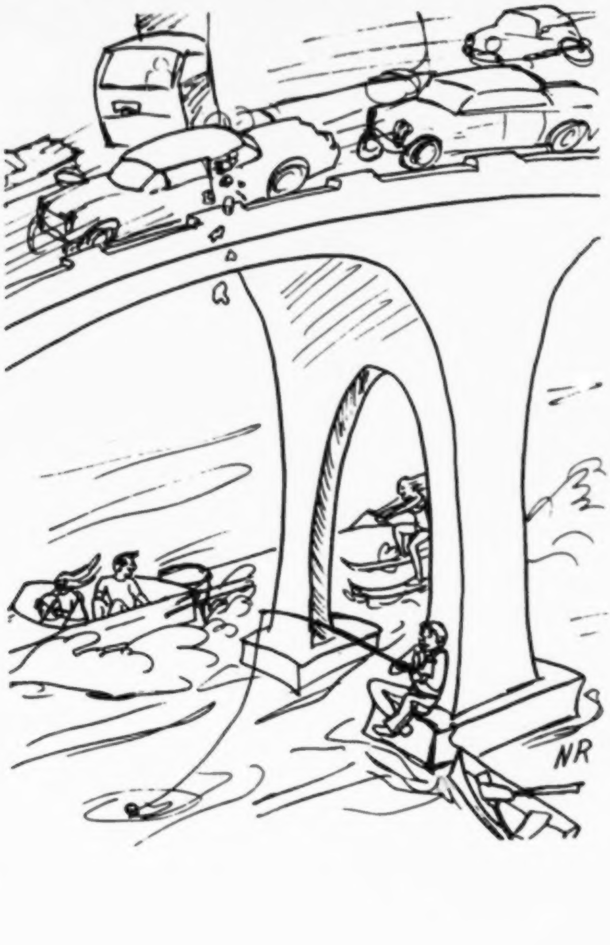
Catch a fish and examine its stomach contents. If possible, preserve contents in formaldehyde. Key each jar to the fish species and its habitat.

Discuss why successful fishermen must know what fish eat. Make a chart of fish species and food preferences.

A-3 THE FISH COMMUNITY

If a pond or stream is accessible, collect plant and animal samples from different locations. Include the water's edge, below the surface at different depths, along the bottom starting from shore, and at the surface.

Record and contrast results. Where are different types of fish food found? How are they related? Compare plant and animal species from different bodies of water, such as a pond, lake, marsh, or stream.



A fish community?

A-4 DO FISH LIVE HERE?

Test the various physical components of the fish environment. This does not necessarily mean you have to invest in elaborate equipment. Students can have fun making their own. For directions, visit a local fishery biologist or limnologist at a nearby university or game and fish department.

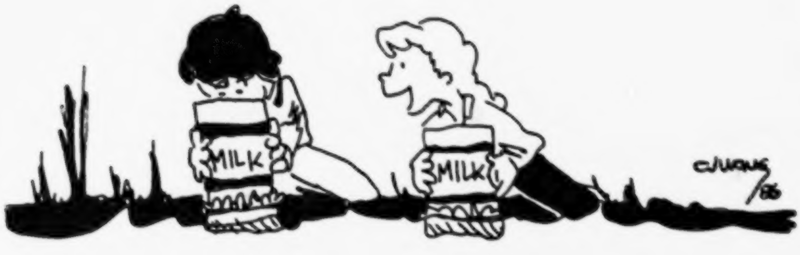
The data and equipment needed include:

a. Cupped thermometer for taking different temperatures. Make a temperature map.
b. Dip and seine nets and a bottom dredge for organism sampling.
c. Chemical testers for hardness, dissolved oxygen, and microorganisms. (Inexpensive kits are available, see Resource Appendix.)
d. Water speedometer (bobber on fish pole with timing watch).
e. Secchi Disk — a white No. 10 can top lowered with fish line to measure visibility.

At first such activities may seem "too sciency" but an active comparison of fish environments using maps and charted data can produce loads of information. Fisherman should know exactly what fish "homes" look like from the surface. It's better than reading it in a book.

A-5 WATERSCOPE

Take a close-up look underwater at a pond or stream edge with a waterscope made from a milk carton. Cut off the top end of the carton and cut a window in the bottom. Cover this with clear cellophane. Have the students place their waterscope in a pond and/or stream. Ask them to record what they see and the differences between the two habitats.



A-6 CONSTRUCTING FISH HABITAT

Make flash cards of local fish species. Divide class into teams of two or three, and have each group pick a card. Using butcher paper, ask each group to draw or construct its fish's habitat for all four seasons of the year. Each of the four habitats must include food, water and cover. After drawings are complete, have each group present its picture to the rest of the class. The class must find all three habitat requirements in each drawing and decide if the fish can live in such a habitat.

Discuss where students have seen the fish on the cards (local lakes, streams, ditches, etc.) and how the fish obtain their food, water and cover.

Objective B: Identify the parts of a fish.

B-1 FISH PARTS

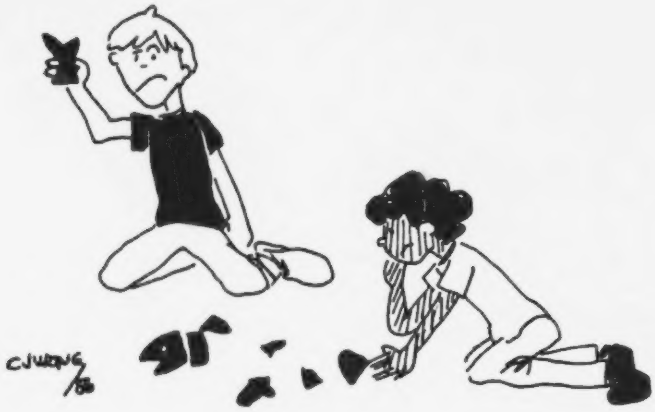
Reference material should be used by students for drawing and labelling the various parts of a fish. Start a quiz game to help learn parts on different species. Discuss the functions of these parts and various adaptations to water environment.

B-2 MAKING A FISH CAST

An activity which involves catching fish, working as a group on a class project, and providing unique classroom displays is well worthwhile to pursue. For directions, see page 139 at end of chapter.

B-3 FISH FRAGMENTS

Draw several local fish species on a piece of cardboard. Clearly show all fins and parts. Cut into jigsaw puzzles and have students reassemble the fish. Discuss the functions and adaptations of each fish part, and how they differ among species.



B-4 FISH PRINTS

Fish printing is an interesting form of art practiced by the Japanese. Using paint and local fish, students can learn to identify species and fish parts.

For directions see page 140.

Objective C: Recognize fish species by contrasting characteristics.

C-1 USING FISH CARDS

Have students draw and color pictures of fish common to your area on white poster board. Include its habitat and food on the back of each. Compare differences in structure. Discuss adaptations such as mouth structure in relation to food. Is the fish a bottom or surface feeder? Does it feed on minnows, flies or algae?

C-2 FISH SCALE COLLECTION

Collect samples of scales from as many different species as possible. Get enough from each species for the entire class to observe.

Using hand lenses, ask students to first approximate the fish's age (crowded rings form during winter and widely spaced rings are from the summer's growth). By gathering scales from different species, ask students to group scales by similar characteristics (size, shape, texture, or whatever). Are there any similarities between your groupings and species characteristics? Discuss scale adaptations and habitat. Consult the Reference List on page 141 for basic ichthyology textbook information.

C-3 WHAT WATER

Find out what kinds of water (cold, warm, semi-polluted, etc.) can support your local fish species. Discover where (pool, riffle, underbanks) in these waters the fish live and why. Discuss adaptation differences.

Objective D: Recognize feeding and breeding habits of various species.

D-1 THE FISH STORY

Many movies or other forms of media serve as excellent resource material for identifying fish habits. Assemble a vertical file of magazine or newspaper articles pertaining to habits. Keep an index file on feeding and breeding habits. Construct charts which indicate peak feeding or activity periods and water temperatures. Where, when and how do different fish species breed? What is the average survival rate per hatch of different fish?

Topic II. Fisheries Management

GENERAL BEHAVIORAL OBJECTIVES

The student will be able to:

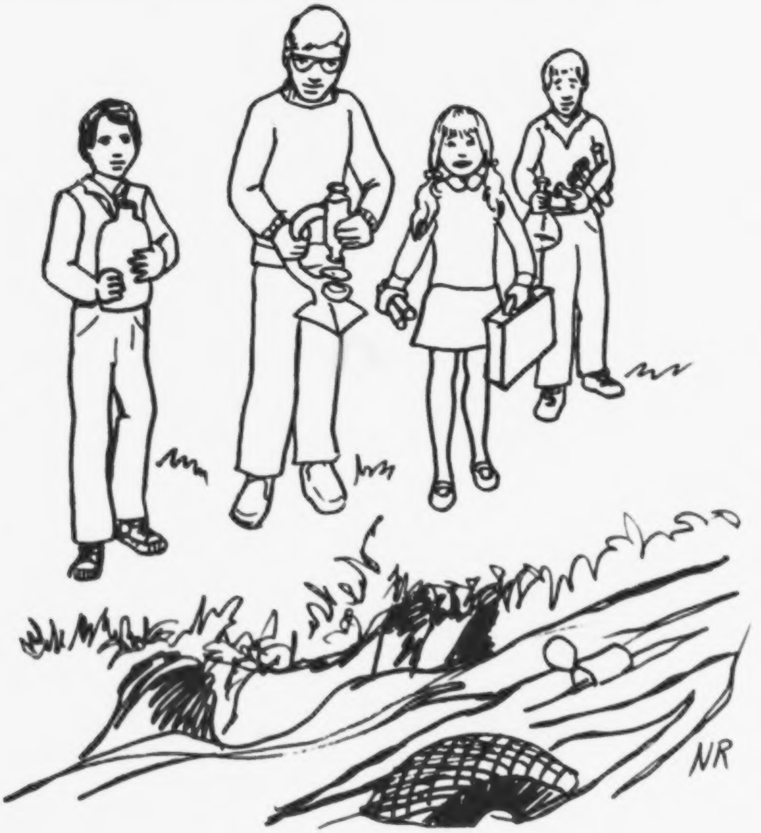
Objective A: Relate problems in fish management to habitat conditions.

A-1 IS DILUTION THE ONLY SOLUTION TO POLLUTION?

List and describe various types and sources of water pollution. Photograph examples of water pollution in your area. Identify possible causes and results. Perform simple water quality tests for dissolved oxygen content and other factors as discussed in activity A-4 in Topic I.

Discuss difficulties in solving water pollution problems. Include identification, proof of effects, economic questions and policy decisions. Incorporate these ideas into a simulation game.

Initiate a clean-it-up campaign. Invite representatives from conservation organizations such as Trout Unlimited and discuss how you can help abate pollution. Discuss how action committees can get results by writing letters, filing complaints and reporting to appropriate agencies.



Do fish live here?

A-2 THE UNDESIRABLES

Invite a fish biologist to class to make a presentation on fish diseases, undesirable species, and overcrowding. Discuss what prevention measures can be taken to help eliminate these problems.

Compare the results of this discussion with C-1, AN ECOSYSTEM, under the section on Wildlife Ecology. Keeping a natural aquarium in balance is the key to minimizing undesirables.

Objective B: Understand that fish management is a cooperative effort of the state conservation agency and society to improve habitat and fishing success.

B-1 THE HATCHERY FIELD TRIP

This is one you shouldn't miss. Ask an official to describe the process from egg procurement to stocking. If the trip is impossible for an entire class, go yourself, take slides and notes, and bring the experience to the classroom.

B-2 THE WAYS AND MEANS STUDY

As a follow-up to Objective A's activities, map out waters in your locality that could be improved. Outline a plan of action for each environment. Include: erosion contol, pollution abatement, draining and stocking, deepening, vegetating or de-vegetating, or establishing balanced populations. See Resource Appendix for references. Find out what local agencies are doing in your area to help improve fish environments.

B-3 "QUALITY FISHING"

Quality fishing is found where the fish are wild (not stocked) in the most natural setting possible. Write your state fishing agency asking for maps of quality fishing areas in your state. If this information is not available, map out the wildest waters on your own.

B-4 WHAT THE BOOK SAYS

Obtain copies of fishing laws and regulations. Divide the laws between student groups. Have each group identify the law, give its specifications and supply possible reasons for it. Discuss what the limitations of such laws are.

Invite a wildlife conservation officer to your class to describe his duties and the problems he faces. Write for this information if a visit is not possible.

B-5 RESEARCH AND EDUCATION AS MANAGEMENT TOOLS

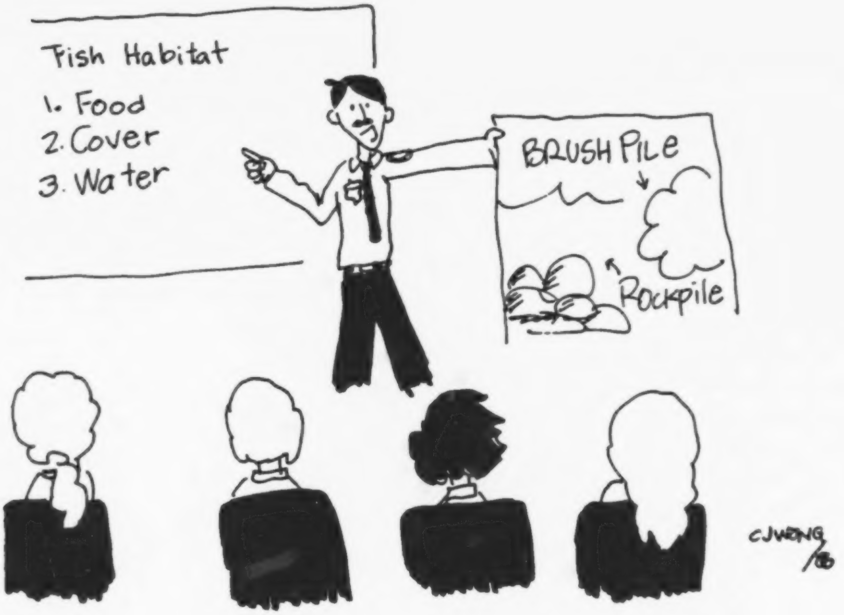
Ask students to give examples of fishery research that has helped fish and fishing. Assign individual mini-projects to each student. Have them research or experiment to find out information and then report on it.

Students could, for example find out what

—a rainbow trout eats
—scientists do to estimate fish populations
—enemies bass have
—purpose particular fish coloration serves.

B-6 HELPING FISH HABITAT

Ask a local fish biologist to describe the characteristics of good fisheries habitat. Have him or her explain ways (bank protection, brush piles, etc.) to improve local lakes and streams.



B-7 EXOTICS AND THE LAW

Obtain copies of fishing laws and regulations. Check which fish have been introduced into your state and why. Find out why most states have laws prohibiting the introduction of non-natives, and what has been the result on native fish through such practices.

Topic III. Fishing Techniques

GENERAL BEHAVIORAL OBJECTIVES

The student will be able to:

Objective A: Demonstrate proper technique associated with various types of equipment.

A-1 KNOW YOUR EQUIPMENT

Using visual aids (make them with overhead transparencies from reference material or make slide shows), discuss with the class the differences between the four types of reels.

Describe the functions for each part. The best method is to acquire a set of rod and reels of each type. Show four students how to operate and maintain each reel type. For example, for the bait-casting reel, include selecting proper line, lubrication points, mounting on rod, putting line on, and drag, backlash and spool-end play adjustments. This may sound complicated but a simple fishing book usually covers this information adequately.

These four students can then instruct the rest of the class in small groups of six. Rotate with each outfit four times.

A-2 HOMEMADE FISHPOLE

After the class has become familiar with the theory behind rods, have them make their own. A variety of commerical kits are available in all price categories (see Reference List). Homemade ice fishing outfits can be made of almost anything and usually produce results. Hold a "creative pole" contest for the most unique design, most functional, and the like.

Objective B: Rig an outfit properly for different situations.

B-1 THE BALANCED OUTFIT

Discuss what balanced equipment means. Set up different rigs with some in balance and others out of balance. Ask students to compare these outfits by looking and casting. Have them select those which are in balance. Keep in mind the purpose of each set-up.

Follow up with a discussion of relationships between rod and lure, line and lure, and rod and line.

B-2 HE TOOK IT HOOK, LINE AND SINKER

One can get pretty frustrated when walking through a well stocked tackle shop unless he or she knows that sometimes tackle is designed to "hook" people rather than fish.

As an activity, take a class through a tackle shop. The proprieter might be willing to describe the purpose for the variety of tackle.

Using any tackle you can obtain, put together demonstration boards with a collection of hooks, lines and sinkers. Label each item and explain its uses.

Test the "hooking power" of various hooks by setting the points slightly in a bar of soap. Pull the line and observe the penetration and holding power of the hook (leather works well also). Test the accuracy of line ratings by adding known weights to it and noting when it breaks.

B-3 KNOTS

The best technique for learning how to tie fishing knots involves using bent coat hangers for hooks and nylon cord for line. Large chart diagrams of knots also help. See references for source of "How-To-Do" booklets.

Divide the class into groups of two or three. Give them the hooks, cord and knot diagrams. Rotate the different "knot diagram problems" between the groups so everyone learns how to tie all the knots.

Objective C: Understand the use of various types of bait.

C-1 THE WORM BOX

Dig worms from rich, loamy soil. Sprinkling the lawn first and picking nightcrawlers at night with the aid of a flashlight is another method.

Put them in a tight wooden box filled with damp, fine sand. Put a large chunk of damp moss and compost in the middle and cover it with coffee grounds, corn meal and bread crumbs. (This is their food.)

Store your box in a cool shady spot. Cover it with one or two burlap bags and keep the contents moist (not wet). Keep the moss and compost clean by examining the contents every week or two. The worms will clean and toughen themselves in the sand and reproduce in the moss.)

C-2 FISH FOOD

A collection of living natural baits helps develop student interest in natural history and answers many "whys?" of the beginner fisherman.

Everything from zooplankton to amphibians can be kept healthy in the classroom. Food chains and life cycles can be witnessed rather than read about. (See reference listings.)

Labelled animals along with the names of the fish that eat them provide a good introduction to "match the hatch" theory. Here again, we can cut open a freshly caught fish to examine the contents of its stomach. Put this in a jar of water. Compare for different fish species and localities.

C-3 THE LURE PROJECT

Spoons, spinners, plugs, jigs and flies all have different uses. The best means of finding out what's best for your area is to ask experienced locals, either tackle salesmen, fishermen or conservation officers. Discuss the principle behind these lures and then set the plan.

By hunting around at popular fishing spots or leaving donation boxes at tackle shops and sportsmen clubs, collect as many lures as you can. Money earned from reconditioned lures can supplement your fly tying materials.

C-4 FLY TYING

As a true art form, tying flies can be a terrific class project. Initial costs can be kept to a minimum by using household items for equipment and materials. The best way to learn fly tying is have an expert show you, however, there are good "how-to" books in sports shops and libraries.

Make a collection of dry and wet flies, streamers and nymphs. Ask students to guess the purpose of each type.

C-5 THE TACKLE BOX

Ask each student to make a list of items he would carry in his tackle box. Free fishing catalogs can be used as reference material. Put a limit on the money they can spend. Ask them to describe the purpose for each item and include the type of fishing they have in mind.

A demonstration board would be useful as a visual aid to reinforce the proper selections. Be sure to cover how to use and care for all the tackle included.

Objective D: "Read" the water to determine probable locations of fish.

D-1 READ THE WATER

Have students draw hypothetical maps of lakes, ponds and streams. They might even map an area they recently fished. Have them include obstructions, shaded areas, eddies, bottom contours, inlets and outlets, and current flow.

Ask students to point to areas where they would fish and ask them to explain why. They might also explain fishing technique, time of day, and bait to use.

Objective E: Demonstrate how to catch a fish.

E-1 CASTING BASICS FOR FUN

Analytic drawings, clock diagrams and rod grips can get so complex that learning pleasure is lost with the first toss.

The single and double stroke casts made overhead from the one-o-clock to ten-o-clock positions will develop a feel for accuracy and distance.

A set of five rods and reels rigged with hookless plugs can be shared among class groups. Two spin casting outfits, and one each of fly, spinning and bait casting would make up an ideal set.

There are several good videotapes (VCR and Beta) on casting that are available through catalogs and sporting goods stores.

E-2 LANDING A KID

Once the basic casting techniques are mastered, depart from the traditional "toss the plug in the hoop" approach.

Four basic techniques which are essential to actually catching fish include hook setting, playing fish, pumping in line, drag adjustment and landing the fish.

For setting the hook, use a carved bar of soap to simulate a fish, and have kids practice making that sharp rearward motion to pull the line into the fish. Variations can be developed depending on the direction of flow and the fisherman's position.

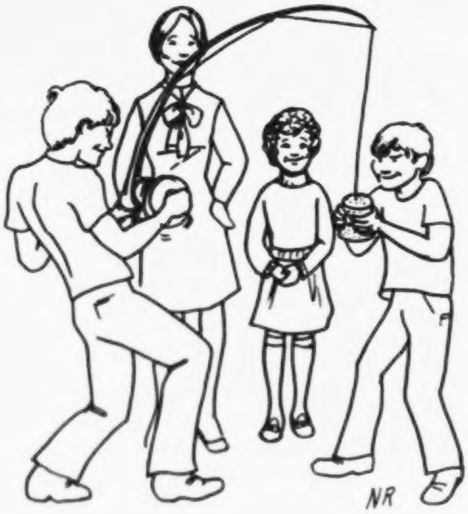
For playing a fish, the object is to not have the line broken. A student holding onto the hookless plug can help the beginner learn how to adjust the drag and release and reel line.

Using a wooden fish, one could also practice pumping in line. Two could practice the proper technique of landing or netting a fish in a boat. Practice like this will at least familiarize students with various techniques used in fighting fish.

Objective F: Demonstrate proper catch-and-release fishing.

F-1 CATCH AND RELEASE

Catch-and-release fishing is a very popular sport. Invite an experienced angler or fish biologist to demonstrate proper ways to release different fish species after catching. Discuss the benefits of catch-and-release fishing.



You can't teach what you don't know.

Objective G: Demonstrate awareness of fishing safety.

G-1 HOOKS ARE A PAIN

Have students demonstrate how to store and handle hooks safely.

Demonstrate how to back out a hook if the barb has not penetrated the skin. Explain that if the barb is imbedded, it's wise to have a physician remove it. If a physician is not available, the Standard First Aid Manual recommends hook removal by pushing the barb on through, cutting either the barbed or shank end and removing it, then cleansing the wound and contacting a physician for a tetanus shot.

G-2 FISHING CAN BE HAZARDOUS

Ask students to list all the possible accidents associated with lake or stream fishing. Include a description of situations that could lead to drowning or injury, such as using waders, falling while bank fishing, careless casting, etc. Discuss these situations and the precautions to be taken.

Boating safety is a course in itself. At least go over your state's boating and water regulations. Perhaps enroll the class in a boating safety course.

Objective H: Demonstrate proper methods of transporting and preparing fish.

H-1 HOW TO KEEP FISH

A creel can be made in class as long as students are aware of its purpose.

Using cloth or plastic bags or other materials such as wicker, remind students that most anything will work as long as it's transported easily, keeps fish cool and remains moist. Wet grass is a helpful addition to creels.

Stringers can be made easily also. Discuss how to improvise using fish line and a couple of sticks.

H-2 CLEANING AND COOKING

The best way to learn is by doing, so get the class out where pan fish are plentiful. Put to use all the skills dealt with in class. Handling bait, catching, cleaning and cooking fish all could be covered in one Saturday.

Most elementary fishing books will provide step-by-step directions on how to clean fish. The best way is to show the class how while they're doing it.

Broiling, baking and frying fish can be demonstrated in class using electric skillets or a small fire pit built outside. Collect recipes, put together a booklet, and hold a fish dinner for parents and teachers. Proceeds can go toward building up class fishing resource supplies.

Topic IV. Fishing Etiquette

GENERAL BEHAVIORAL OBJECTIVES

The student will be able to:

Objective A: Appreciate the quality aspects of sportsmanlike fishing.

A-1 RANKING THE CHALLENGE

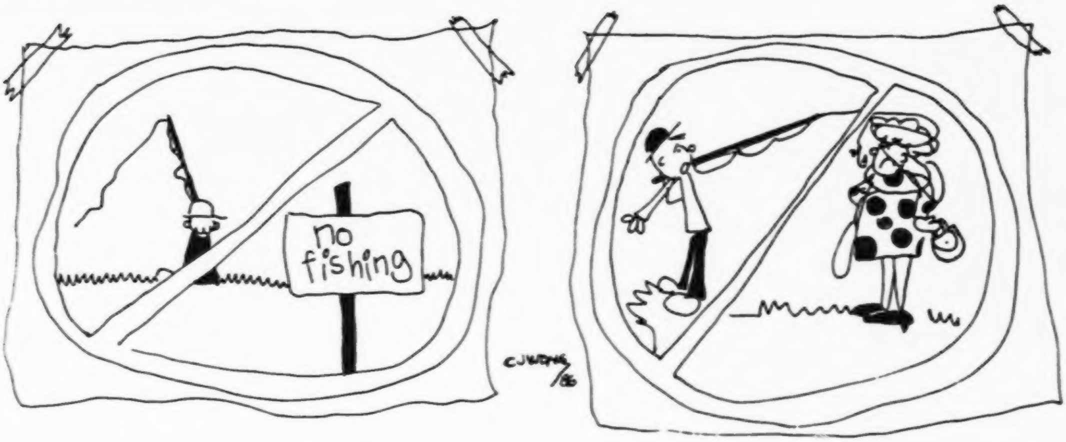
Quality is a relative term in that it suggests the challenge or contest involved in pursuing the game. Therefore, catching panfish with worms represents quality fishing for the beginner but not for the expert. Standards for quality involve many other factors, including access to fishing water, methods used, learning the area yourself, and returning an unneeded catch. Students should be aware of quality and what it means.

As a means to identifying the range in quality fishing, give students lists of fishing techniques, fish species, access methods and environments of the pursuit. Have students rank them in order of highest quality to lowest quality. For example, highest quality fishing might mean catching native trout with dry flies on a backpacking expedition into a wilderness area. Low quality might imply catching carp in a polluted city stream using seines.

Compare lists by discussing the differences in quality for different people. Include the low quality aspects of cheating and lying.

A-2 INTERNATIONAL FISHING SIGNS

List desirable and undesirable fishing behavior. Break into groups of two or three, and have each team design an international sign illustrating one of the listed undesirable behaviors.



Objective B: Appreciate aspects of ethical conduct while fishing.

B-1 THE FISHERMAN'S QUESTIONNAIRE

Two types of questions might be asked of local fishermen: 1) why they fish, and 2) what problems, if any, they encounter when fishing around others. Questions might be left open-ended for written replies. Distribute to local sport shops and parents. Compile and discuss your results.

B-2 BEHAVIOR CHECK SHEET

As a class project design a Sportsman's Behavior Check Sheet which indicates types of good behavior common to a true sport fisherman. Make the list as complete as possible by dividing behavior into categories under skills, knowledge, attitudes and habits. The purpose of the sheet is to remind people of sportsmanlike behavior. Such things as littering, respect for property, courtesy, handling non-keepers too much, "ecology-mindedness," camping care, and the like should be discussed. Distribute these check sheets to local stores and conservation agencies.

B-3 THE FISHERMAN'S CODE

Have students write a short paragraph or two describing what they feel is meant by the statement, "Limit your catch, not catch your limit." Try other sayings out, like the Chinese proverb, "A chicken that's cooked wrong is a chicken killed in vain."

Read the students' remarks aloud and discuss the variety of interpretations. Compare these remarks with the "Ethics for Anglers."

Note to the teacher:

Following the completion of the activities in this chapter, students should be able to develop their own ethics list similar to the one provided below.

Ethics for Anglers

Fishing is an aesthetic and contemplative sport. That is — if other fishermen will allow it to be.

There are certain unwritten ethical rules to be followed in fishing that seem to be falling by the wayside as numbers of fishermen increase. These ethics are probably basically English in origin although they merely represent good manners.

Following is my idea of the major considerations:

1. **On small streams a pool or riffle area belongs to the person fishing on it and he should be left undisturbed. If you want to fish there, sit and wait until he is through. If you want to pass him do so, but walk around him as far away from the water as possible. Don't walk the streambank or let your shadow cast his fishing water area.**
2. **Don't "move in" on a successful fisherman. Chances are he's just a good fisherman and will move on to where you were and still catch fish.**
3. **Stay away from other fishermen's back-cast areas. This is really for your own safety.**
4. **Don't let your children bother other fishermen. For that matter don't bother them yourself unless invited. Such statements as "how many ya got," "whatcha catching 'em on," "what fly ya using" may or may not be all right depending how conversationally-minded the other fellow is.**
5. **Boat use can cause lots of altercations.**
   a. **Don't run your boat close across or behind another boat obviously trolling.**
   b. **Don't speed by anchored fishing boats or bank fishermen so as to cause them discomfort from your boat wake.**
   c. **Don't troll or anchor your boat immediately in front of bank fishermen. You have far more fishing water at your disposal than they do.**
6. **Clean up your litter. This is basic at streamside or anywhere else. The outdoors is not yours exclusively.**

These common courtesies become increasingly hard to follow as larger crowds of fishermen frequent the more popular fishing areas. It actually makes them more important under such circumstances however.

We all try to teach our children good manners either by lesson or example. Let's do the same thing for them on stream and lakeside manners.

W. R. Seaman
Colorado Division of Wildlife

Activity B-2 (Investigating Fishing, Topic I, B-2)
MAKING A FISH CAST

Time: Two class periods

Materials: Plaster of paris, fine sand, vegetable oil, long headless tacks or pins, Vaseline, large shallow dishpan, cheesecloth, a bar of soap, wire screening, shellac

Purpose: To identify various local fish species by making models from carefully molded fish casts.

Procedure:

1. Using a freshly caught fish that's been cleaned of dirt and slime, embed in moist sand that's been smoothed out in plastic dishpan. Be sure that one half is perfectly covered to include back fins and the midline of the belly.
2. Spread fins outward and tack them to the sand. Make sure the gill cover and fins on the exposed side are also pinned flat to the body.
3. Brush the fish with the oil to prevent plaster from sticking. Make up enough plaster of paris to cover the fish with at least a ½ inch layer. Experiment with making plaster of paris beforehand to reach the desired consistency and drying time.
4. Pour the plaster over the fish and allow it to set for 10 to 15 minutes. Wait for the casting to thoroughly harden. Remove the cast by turning the mold over and carefully removing the fish.
5. Coat the inside of the cast with a mixture of soap solution and Vaseline. Laundry soap shavings covered with water forms a jelly-like mixture if allowed to set overnight. Mix this with a little Vaseline to make your mold release paste.
6. Using fine insect screening, cut out shapes to exactly match the fins. Extend a base for each fin screen to serve as support. The screen will help prevent the fins from cracking off the finished model.
7. Fill the mold with at least a ½ inch of plaster of paris. Press the screen cut-outs into the plaster at the proper locations. Push small strips of cheesecloth into the plaster to add strength to the dried model.

8. After the model has thoroughly dried, remove the cast by prying it up at several different points. Tap it lightly if it sticks.
9. Paint your model with a light coat of shellac. Using tempera or acrylic paints, reproduce the natural coloration of your fish.
10. Glue your model half to a rustic-looking wooden plaque. Label it and provide information about where and how it was caught.

Activity B-4 (Investigating Fishing, Topic I, B-4)
FISH PRINTS

Time: One class period

Materials: Several small, whole fish that have scales, fins and heads — sunfish, bluegill or crappie work well (keep them cold until ready to begin), hairspray, acrylic paint, flat wide paint brush, paper towels, newspaper, paper

Purpose: To identify various local fish species by making prints of each animal.

Procedure:

1. Without altering scales or fins, gently wash and dry the fish.
2. Spray one side of each fish with hairspray.
3. With the brush, carefully stroke paint over every part of the fish. Wipe off all paint on the eye. Lift the fish onto clean newspaper, paint side up.
4. Place a paper towel on top of the fish as a trial sheet, and hold in place with one hand. Without moving the paper, press down on the paper with the other hand and touch all body parts.
5. Slowly lift the paper. If the print is blurred, too much paint has been used. If the print is faint, the paint was too dry, or too little paint was used.
6. For final prints, use heavier paper, parchment or cloth. Experiment!

Reference List — Fishing

Books

Curtis Creek Manifesto. Sheridan Anderson, Frank Amato Publ., Portland, OR. 1978. Fully illustrated (and very funny) guide to strategy, finesse, tactics, and paraphernalia of fly fishing.

A Guide to the Study of Fresh-Water Biology. J. G. Needham and P.R. Needham. Holden-day, Inc., San Francisco. 1962.

Matching the Hatch. Ernest Schwiebert, Stoeger Publishing Co., N.Y. 1972.

Nymphs. Ernest Schwiebert. Winchester, N.Y. 1983.

Tying Western Trout Flies I & II, Jack Dennis.

Magazines

Your State Wildlife Conservation Agency Magazine. Request subscription for your school.

Bassmaster. Bass Anglers Sportsman Society, P.O. Box 17900, Montgomery, AL 36141. Up-to-date information on bass-related topics, boats, motors, tackle, etc.

The In-Fisherman. P.O. Box 999, Brainerd, MN 56401. Articles cover latest tackle, techniques, limnology, and fish behavior to help anglers catch more fish in natural lakes.

Flyfisherman and *Trout* — at news stands.

Organizations, Associations, etc.

Your State Wildlife Conservation Agency. Request list of available films, booklets and pamphlets.

American Fishing Tackle Manufacturers Association (AFTMA Center, 2625 Clearbrook Dr., Arlington Heights, IL 60005). Excellent "all-about" brochures on fishing lures, lines, accessories, rods and reels, and "how-to" booklets on fresh and salt water fishing.

Cabela's. Request catalog of fishing equipment and rod building kits.

Cortland Line Co. (P.O. Box 5588, Cortland, NY 13045). Write for excellent "how-to" booklets.

Future Fisherman Foundation. (One Berkley Drive, Spirit Lake, IA 51306) Write for "Fishing Fun for Kids" booklet.

L. L. Bean (Freeport, ME 04033). Write for free catalog of fishing tackle and clothing.

Orvis Co., Inc. (Manchester, VT 05254). Free booklets on selecting fly rods and lines.

3M Co. (3M Center, Building 220-7W-02, St. Paul, MN 55144). Request list of videos and teaching material on fishing.

Zebco (P.O. Box 270, Tulsa, OK 74101). Ask for "Basic Casting from A to Z" booklet which covers casting techniques, knots and fish identification.

Local Sporting Goods Stores. Videos, films, booklets and pamphlets available.

Other Teaching Packages

Casting and Angling. Safari Club International Conservation Fund (5151 E. Broadway, Suite 1680, Tucson, AZ 85711). Contains 5-day unit plan, drills, games, transparencies, handouts, and examinations.

Water Education. Dr. Donald R. Daugs (Dept. of Elementary Education, Utah State University, Logan, UT 84322). Activites for Grades K-6.

Courses

Orvis Fly Fishing School. Orvis Co., Inc., (Manchester, VT 05254). Three-day session covers fly fishing basics, fly selection and use, water types, and fish behavior. Gear and room and board provided.

CHAPTER 9

Investigating Hiking and Camping

Topic Outline

I. Nature of Hiking and Camping
  - A. Reasons for
    1. Pleasure of "Cutting loose"
    2. Solitude
    3. Exploration
    4. Exercise
    5. Simple living
    6. Challenge
    7. Nature appreciation
  - B. Types
    1. Wilderness backpacking
    2. Trail camping
    3. Specified campsite camping
    4. Roadside recreational vehicle camping
  - C. Ethics
    1. To land
       - a. Litter
       - b. Pollution
       - c. Erosion
       - d. Biotic damage
    2. To fellow man
       - a. Noise
       - b. Overcrowding
       - c. Property damage

II. Hiking and Camping Techniques
  - A. Basic necessities
    1. Clothing
    2. Food
    3. Sleeping
    4. Shelters
    5. Packs
  - B. Planning skills
    1. Trip planning
       - a. Itinerary
       - b. Supply and equipment plans
    2. Leadership responsibilities
       - a. Obtaining permits and permission
       - b. Leaving word
       - c. Checking conditions
       - d. Equipment check sheet
       - e. Determining group abilities
       - f. Extra emergency supplies
  - C. Hiking skills
    1. Conditioning
    2. Hiking comfort
       - a. Energy
       - b. Hiking steps
       - c. Safety
       - d. Footwear and care
       - e. Walking sticks
    3. Leadership responsibilities
       - a. Establish pace
       - b. Destinations
       - c. Directions
       - d. Awareness of warning signs
       - e. Safety and first aid

D. Camping skills
  1. Site selection
    a. Wind
    b. Water
    c. Fire hazards
    d. Temperature
    e. Topography
  2. Campfires
    a. Building
    b. Extinguishing
    c. Erasing traces
  3. Stoves
    a. Types
    b. Use
    c. Care
  4. Cooking
    a. Menus
    b. Preparation
    c. Clean-up
    d. Food storage
  5. Sanitation
    a. Garbage
    b. Toilet

E. Miscellaneous skills
  1. Knots and lashings
  2. Tool use and care
    a. Knife
    b. Hatchet
    c. Axe

Introduction

The mark of an accomplished outdoorsman was once determined by his ability to successfully conquer and subdue nature. With our intentions focused on recreation rather than survival, today's challenge for outdoor enthusiasts lies with visiting a natural area without leaving any human trace behind.

The miracle advancements in recreational equipment have made it easy for us to forget our outdoor responsibilities. Wilderness to some has become nothing more than an extended backyard. Consequently, both man and nature stand to suffer from resulting careless neglect.

The purpose here is to sensitize the individual to the frailties of our recreational areas. It must be imposed upon the user that every outdoor misdeed will be compounded by those who follow. Likewise, those who exercise care and good outdoor manners are buying time for the future of their sport and their natural resources.

Curriculum Lesson Ideas

Topic I. Hiking and Camping Philosophy

OVERVIEW

The standard "outdoor living" instructor is usually obsessed with the "how-to-do-it" or the "show-n-tell" approach. This should be avoided as basic principles of hiking and camping can be delivered by utilizing student curiosity. Design learning experience to acquaint the individual with the pleasures offered by the outdoors. Stress the "leave no trace" ethic whenever possible. In the outdoors, the more we are aware, the more we will enjoy and appreciate. A key to awareness is taking our time. As Gandhi put it, "There is more to life than increasing its speed."

GENERAL BEHAVIORAL OBJECTIVES

The student will be able to:

Objective A: Understand that people enjoy hiking and camping for different reasons.

A-1 AREN'T WE ALL NATURE LOVERS?

Hikers and campers sometimes develop a self-righteous attitude about their particular style of enjoying the outdoors. For everyone's needs and interests to be met, members of this group should understand the viewpoints of others.

Have students list reasons for going hiking and camping. Try to identify as many different categories as possible. What common factors can be found among them? Attempt to bring out the importance of a natural environment rather than a man-dominated environment in outdoor recreational areas.

Objective B: Differentiate the types of hiking and camping.

B-1 DIFFERENT WAYS TO OUTDOOR PLEASURE

Ask students for examples of types of camping. Include a discussion of differences between varieties such as recreational vehicle camping, wilderness backpacking, trail camping, and specified campsite camping.

Make a composite listing of these types and have the students re-order this list in terms of highest quality to lowest quality camping. "Quality" may refer to the challenge involved.

The purpose is to take advantage of different viewpoints between student ranking orders. For example, vehicle camping might be regarded high quality by some over wilderness camping. Because people have different reasons for camping, no "correct" ranking exists.

Discuss the implications of this situation in terms of recreational area management. For example, how would the Park Service and other agencies go about meeting everyone's needs? Also discuss permit systems, restricted areas, and multiple-use areas.

Objective C: Apply ethical behavior to hiking and camping situations.

C-1 THE CAMPER'S GOLDEN RULE

Ask students to list why they enjoy hiking and camping. If they present such reasons as "challenge," "exercise," or "cutting loose," again ask why they pick camping and hiking areas to do it in. Attempt to identify the common element linking all reasons, that is, something that nature offers which man's world does not.

Ask them to foretell the natural world's future if no outdoor ethics were followed by anyone. Stress that the signs of man would be everywhere and that the natural world would then become a man-dominated world. Impress upon students that we must act in every way possible to preserve the unqiue qualities of our natural areas. Have students list ways of preserving these qualities. Include responsibilities that go beyond taking care of our own habits. Clean up and inform others of the Camper's Golden Rule.

C-2 THE COSTS OF DISREGARD

Perhaps if more people were aware of the results of certain actions, they would be more responsible.

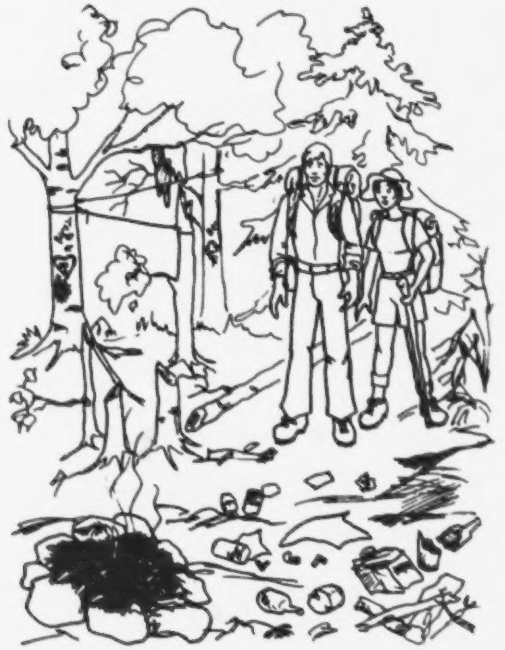
Under the categories of litter, pollution, erosion, and harm to plant and animal life, ask students to provide at least three common behaviors which may contribute to such problems.

Discuss how each one of us could help eliminate these actions. For example, mention the benefits of tactful reminders such as asking campers for any garbage you could carry out.

Invite a park ranger to class to explain in detail why one should follow ethical hiking and camping standards. Record the session, take notes, and write an "Outdoor Conduct Booklet." Distribute it to local sporting goods stores and agency offices. The purpose is to provide some of the "whys" behind the "what not to do" rules of camping and hiking.

C-3 HUMAN IMPACT ASSESSMENT

During a class field trip to local camping or hiking areas (even the city park will do), have the class estimate the extent of damage due to visitor use. Prepare "impact assessment sheets" as a pre-field trip activity. Include assessment keys to cover soil, water, plant and wildlife impact. Have students draw maps to indicate heavily used areas.



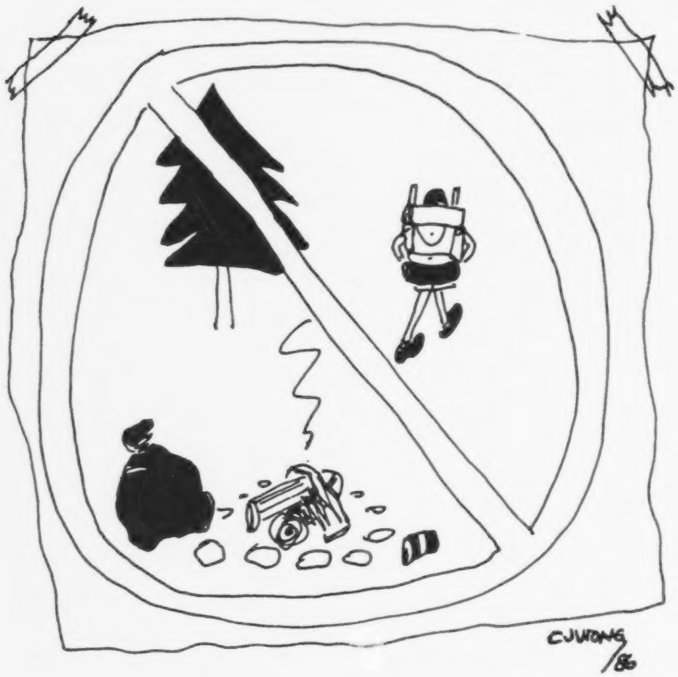
As a post-field trip activity, the class should draw conclusions from their data and propose recommendations. Perhaps you might want to submit your report to the appropriate management agency for their review and comments.

C-4 MANNERS

In playing tennis, it is unethical to throw your racket or walk across someone else's court. Likewise, hikers and campers have a set of unstated courtesy "rules" they should follow. Neglecting such rules may not affect the environment but it definitely interferes with the pleasures of others. Discuss manners concerning noise control, overcrowding, overtaking other hikers, obtaining permission to cross property, registering at trailheads, and obtaining proper permits for fires and camping. Expand this list to include all other possibilities you can think of. Combine lists and make an "Outdoor Courtesy Charter."

C-5 INTERNATIONAL HIKING AND CAMPING SIGNS

List desirable and undesirable camping and hiking behavior. Break into groups of two or three, and have each team design an international sign illustrating one of the listed undesirable behaviors.



C-6 TIN CAN ART

While hiking or camping, students can pick up various sized cans and practice "tin can art" either at the campsite or in the classroom. Many useful camp items, including stoves, shower baths, dippers, candle holders, soapbars and lanterns, can be made with a little imagination.

Topic II. Hiking and Camping Techniques

GENERAL BEHAVIORAL OBJECTIVES

The student will be able to:

Objective A: Demonstrate appropriate use and care of hiking and camping necessities.

A-1 THE WELL DRESSED HIKER

Proper clothing varies with different situations. It is interesting to experiment with a variety of fabrics for wind and water resistance, breathability, water absorbency, heat condition and reflection, and warmth. Collect fabric scraps from stores and design a test for each property. Discuss which materials are best for certain situations.

Describe the "layer system" of dressing. Stress that because body sweat causes heat loss, one should adjust the amount of clothing. Mention the value of dead air space. Bring in clothes to demonstrate proper attire for different situations. Why is wool said to be the outdoorsman's best friend?

A-2 FOOD MAKES IT!

Ask your home economics teacher to come in and discuss the differences between fats, carbohydrates and proteins. Make a chart of foods under each category.

Have students go to a grocery store to make a list of products which would be suitable for camping use. Have them prepare a menu for a two-day trip. Compare lists and menus in class. Discuss calories, digestion time, weight, spoilage, transporting and preparation.

Follow up by preparing a small sample of each meal or snack for hiking and camping. Taste and rate each. Hold a "gorp" contest to see who can make the best trail snack to use while hiking.

A-3 SLEEPING COMFORT

Because the topic of sleeping bags can get complicated, a well-informed, experienced local camping store representative may be your best source of information and demonstration material.

Be sure this presentation includes how to properly use and care for sleeping bags. Keeping them clean, airing them out, and hanging them up when storing are essential pointers for maintaining a bag's dead air space.

A-4 SHELTERS

Shelters can vary from a plastic tube to a camp trailer. Again, the shelter depends on your needs and cash in hand.

Collect different catalogs and make a display board of a variety of tents. With careful reading you can distinguish poorer quality tents from good ones.

If tents are available, demonstrate tent care, pitching and living in your tent. Discuss sealing tents, placing equipment inside, ventilation and fire precautions.

A-5 PACKING IT ON YOUR BACK

Besides covering the standard topics of selection, use and care of the various types of hiking packs, your class should hold practice sessions dealing with: packing for proper weight distribution and handiness; putting on and taking packs off; making impromptu packs out of clothing or other handy items; and walking precautions to follow to avoid strain, water and steep slope hazards.

Using references such as *The Boy Scouts Fieldbook,* involve students in independent backpack construction projects.

A-6 DON'T DRINK THE WATER

It is often impossible to carry all the water needed for an extended backpack or camping trip. Water available from streams and lakes may not be safe for human consumption. Discuss with students the types of pathogens found in contaminated water and the various methods used by recreationists to disinfect and purify the water for use. Make certain students understand the difference between disinfection and purification. All water in the Rocky Mountains should be considered unsafe due to possible Giardia contamination.

Objective B: Demonstrate ability in pre-trip planning.

B-1 THE INSIDIOUS "WE SHOULD HAVE..."

Give each student a brief description of a proposed trip on a 3" x 5" index card. Have them draw up a set of complete pre-trip plans to fit a given situation. Look over each and discuss the type of information needed for proper planning.

Knowing where and how far to go, the trip's difficulty, its duration, with whom to travel, and possible weather conditions are essential planning factors to consider. Compare lists and make up a general master list to serve as a handout.

B-2 LEAVE IT TO THE LEADER

Every outing group should be under the guidance of an experienced individual who can assume leadership responsibilities. Chaos and trouble will be avoided if certain leadership procedures are followed.

Ask each student to write a character description of the good leader. After this, have them list all the responsibilities a leader has. Make up a master check sheet from individual student contributions.

Objective C: Demonstrate understanding of hiking skills.

C-1 TOP SHAPE HIKERS

Conditioning is essential for any lengthy hike. Invite a physical education teacher to class to describe exercises useful for developing strength and endurance. Ask students to demonstrate exercises for each purpose.

C-2 COMFORT HIKING

Hiking does not have to be a grueling experience. Ask students what methods can be used to make hiking enjoyable. When a list is completed, break the class into "research groups." Each group is to find information about its topic and prepare a short class presentation using visual aids and demonstrations.

For example, one group could talk about energy problems. They might talk about the amount of energy expended under certain conditions, rest stop intervals, "gorp" recipes, and other methods of conserving and renewing energy.

Another group might discuss various walking techniques, such as the "limp" and Indian steps. (The former involves letting the leading leg go limp just before full body weight is transferred on it. This relieves the pain from acid build-up in the knees. The latter involves reducing the up and down motion of walking by swinging the hip and leg forward by pivoting at the waist.)

Safety factors is another topic. Crossing streams and walking on boulders, roots, talus, slopes, and steep slopes should be discussed.

Footwear is an involved topic along with foot care. The use and construction of walking sticks are also interesting topics. Ask the class to dream up as many uses for the hiker's staff as possible.

Demonstration collections are possible with all these topics.

C-3 THE TRIP LEADER

Ask students why a group should have one leader in charge. Explain what is meant by, "The group pace depends on the slowest person, why the slowest person should be in front."

Prepare a list of danger signals a leader must know. Have students write a leader's plan of action. What safety precautions are to be taken in given situations?

Objective D: Establish and maintain an ideal campsite.

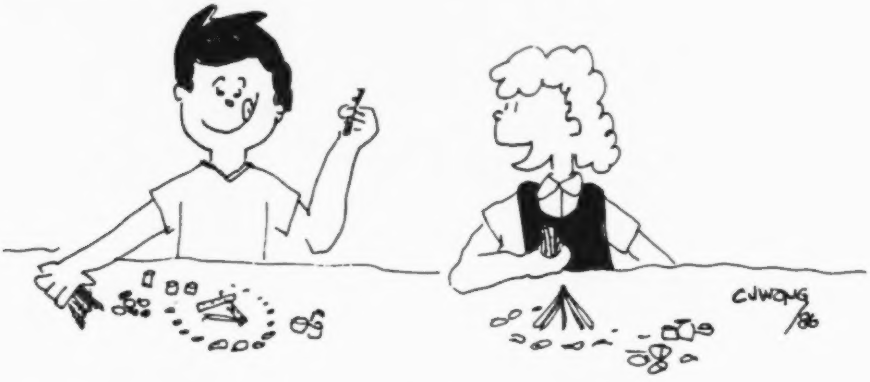
D-1 HOME SWEET HOME

After discussing the factors involved in selecting a good campsite, have each student draw a campsite on a hypothetical teacher-drawn map. These maps should include such variables as slope, wind, temperature, water drainage, compass direction, or cliffs and overhangs.

Model campsites could be made using clay and sticks. Indicate tent and fire attitude. Stress selecting and changing sites to reduce human impact.

D-2 EDIBLE FIRES

Using *The Official Boy Scout Handbook* as a reference (address on page 157), teach different types of fires (A-frame, tepee, log cabin) using candy as tinder, kindling, fuel, and rock fire ring. Pretzels, licorice, mini marshmallows, M & M's, etc., all make great fake wood and rocks. When students have built their fires correctly, let them eat 'em up!



D-3 NO-TRACE FIRE

The beauty and companionship offered by a wood fire is well worth the effort of gathering the wood. But after the last flame turns to coal, we sometimes forget our most important duties — to thoroughly drown the fire and, if we are in a natural area, to disperse the ash and rocks to erase any sign of our presence.

To test a student's ability to select the proper kind and amount of wood, have them collect a variety of wood and build a model campfire without lighting it.

As a practical experience allow students to build small campfires in shallow 5′ x 5′ outdoor sand boxes. Each box should contain different materials to simulate various conditions such as a thick forest duff floor, a rocky surface of wet granite, or a grassy meadow. Go through the steps of drowning and erasing all traces of a fire.

D-4 ONE-MATCH FIRE AND POPCORN RELAY

Building 1- or 2-match fires takes practice and skill. Take your class to a suitable outdoor site and divide the students into teams of two. Spread the groups out and give them each two matches, a small metal pan, some cooking oil, a can for water, and five popcorn kernels. To win the relay, a team must thoroughly clear its area, collect wood, get water, build a fire using only the two matches, pop the popcorn, put the fire out safely and completely, and restore the area to its previous state.

If no popcorn is available, have each team burn through twine or rope.

D-5 CAMPING STOVES

The lightweight cook stove is an important tool for the wilderness traveler. Ask a sporting goods store representative or experienced camper to discuss the use and care of different types of stoves.

Some students might own stoves. Hold a demonstration session covering the operation of propane and gasoline stoves. Go through operating principles. Discuss the importance of finding wind breaks and level areas.

Students can make their own stoves by perforating coffee cans and using wax or kerosene-soaked cardboard for fuel. Experiment with various designs and fuels.

D-6 LIGHTWEIGHT COOKING

Planning menus, prepackaging, and preparing meals is best learned by doing. Have students break up into large groups to plan, package and cook meals and snacks for a three-day trip.

Utensil use and care can easily be demonstrated. Make sure each group covers proper clean-up procedures. Remember that blackened pots heat up faster and that only biodegradable soaps should be used. Dispose of dirty water away from natural water locations.

Food should be stored where animals will not be able to get at it. Remember precautions to take with containers and to reduce odors.

D-7 SANITY IN SANITATION

Human waste disposal becomes a problem in areas of high use where proper facilities are not provided. Although highly biodegradable, wastes may be sources for disease, and smells and unsightly messes are terrible encounters. Discuss the U.S. Forest Service recommendations for waste disposal:

1. Select a spot at least 50 feet from open water.
2. Dig a hole 8" in diameter by 8" deep, depending on the "biological disposer" layer.
3. Cover after use and tramp the sod back in place.
4. Burn the paper or carry it out in a plastic bag.

Objective E: Demonstrate skill in using common camping tools.

E-1 KNOT AND LASHING SESSION

Using an assortment of reference material, prepare information sheets illustrating how to tie and use various kinds of knots and lashings.

Ask students to prepare knot demonstration boards using clothesline and thick cardboard. Hold knot and lashing contest sessions. Provide hypothetical situations and have students solve the problems.

E-2 KNOT SO FAST

After students learn several knots (square, clovehitch, bowline, tautline), divide them into two teams for a relay (use *The Official Boy Scout Handbook* as a reference). From their single-file line, a team member runs to a "knotter" standing several yards away. The knotter says the name of a knot and hands the student a piece of rope. The student must correctly tie that knot, run back to his or her team, tag the next member in line, and sit down. The next student must undo the knot in the rope before tying his or her new knot. The first team to have all members sitting down wins.

E-3 LASH OUT

Practice lashing skills by making objects students can build and use while camping. Using square, diagonal, shear, and continuous lashing, make stands for holding water bottles, cooking utensils or toiletries. Lash small tables, fishing poles, KP chart holders, etc. *The Official Boy Scout Handbook* shows the different types of lashing and their uses.

E-4 TOOL CARE AND USE

Sharpening, transporting and using the knife, axe and hatchet can be demonstrated by the industrial arts teacher or an experienced outdoorsperson.

Depending on your school's policy, each student could bring in a properly protected knife to be sharpened. With handling precautions and respect taught beforehand, have students practice putting an edge on a knife with a wet or dry stone.

Set up outdoor stations where proper knife, hatchet and axe skills can be practiced. Be sure a supervisor is located at each station.

E-5 PAPER KNIVES

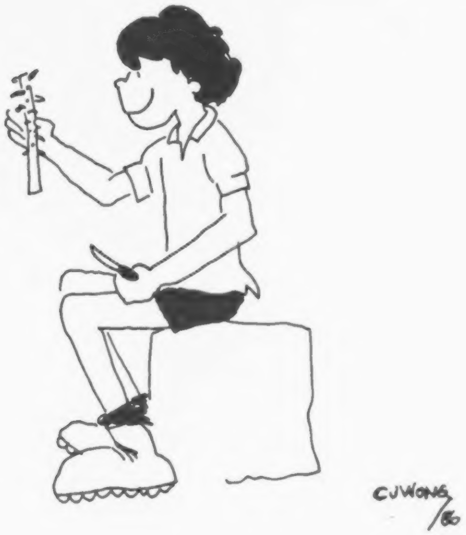
With younger children, knife safety can be taught with paper knives. Make jackknives that open and close using construction paper and brass brads. Give each student a paper knife and explain how to open, close and use a jackknife safely.

For more fun, have students correctly open their jackknives, frost cupcakes with them, safely close the knives, and eat their snack!

E-6 CUTTIN' THE FUZZ

After learning knife safety and use, have students gather small- or kindling-sized sticks. Students can gain knife skills by making short, shallow cuts into the wood and turning the shavings out *without breaking them,* students can create "fuzz sticks" for their campfire. Fuzz sticks are great in the starting fire since the "fuzz" acts as tinder which lights quickly.

Or, instead of fuzz sticks, students can make "friendship sticks" for one another, whittling or carving words, signs and pictures into the wood.



Note to the teacher:

Following the completion of the activities in this chapter, students should be able to develop their own ethics list similar to the one provided below.

Hiking and camping ethics

1. I will not disturb plants and wildlife along the trail or around the campsite.
2. I will use established trails and campsites when available.
3. I will carry out all that I take in, to reduce litter problems and damage to the environment.
4. I will keep fires small and never leave them unattended.
5. I will be considerate of other outdoor users, keeping noise to a minimum and not crowding other hikers and campers.
6. I will not deface, carve or write on anything.
7. I will obtain permission from the landowner first, if I wish to hike or camp on private property.
8. I will always tell someone where I am going and when I expect to return.

*adapted from the S.P.O.R.T. program, Missouri Department of Conservation.

Reference List — Hiking and Camping

Books

Backpack Cookery. Ruth D. Mendenhall, La Siesta Press, Glendale, CA. 1974. A simple right-to-the-point collection of recipes, tips on food groups, stoves and cookware selection.

Backpacker's Budget Food Book. Fred Powledge, New York: David McKay Co. 1977.

Backpacker's Recipe Book. Steve Antell, Pruett Publ. Co., Boulder, CO. 1980. Inexpensive gourmet cooking for the backpacker.

Backpacker's Sourcebook. 2nd Ed. Penny Hargrove and Noelle Liebrenz, Wilderness Press, Berkeley, CA. 1983. A book listing national parks, national forests, clubs, wilderness areas, state parks, books, trails, and permits.

Backpacking. 7th Ed. R.C. Rethmel, New Century, Piscataway, N.J. 1984. Good paperback covering equipment selection, food, safety, backpacking with children, suppliers, wilderness areas, and related organizations.

Backpacking — One Step At A Time. Harvey Manning, Vintage, N.Y. 1980.

Backpacking With Children. Stout and Stout, Ty Crowell, N.Y. 1975.

Games for Backpackers. June Fleming, Animal Town Game Co., P.O. Box 2002, Santa Barbara, CA 93120. 1979.

Mountaineering Medicine. 10th Ed. Fred T. Darville, Jr., Wilderness Press, Berkeley, CA. 1983.

National Outdoor Leadership School's Wilderness Guide. Peter Simer and John Sullivan, Simon and Schuster, Inc. 1983.

The New Complete Walker III. Colin Fletcher, Knopf, N.Y. 1974. One of the most definitive books on backpacking and hiking. The standard all other backpacking books are measured against.

The Official Boy Scout Handbook. 9th Ed. William Hillcourt, Boy Scouts of America, Brunswick, N.J. 1979.

Simple Foods for the Pack. Vikki Kinmont and Claudia Axcell, Sierra Club Books, San Francisco. 1976. Natural, inexpensive ingredients (meatless, sugarless, chemical-free) for the pack. 175 trail-tested recipes.

Starting Small in the Wilderness. Sierra Club Outdoors Guide For Families. Marlyn Doan, Sierra Club Books, San Francisco. 1979. Guide to safe, responsible, low-impact camping. The way to introduce children to the joys of wilderness.

Two-Ounce Backpacker. A Problem Solving Manual For Use in the Wilds. R.S. Wood, Ten Speed Press, Berkeley. 1982.

Walking Softly in the Wilderness. Sierra Club Guide to Backpacking. John Hart (Ed.), Sierra Club Books, San Francisco. 1984.

The Well-Fed Backpacker. June Fleming, Random House, N.Y. How to prepare food in advance, how to package it most efficiently, how to cook and supplement your diet with wild foods gathered enroute.

Wildlife Country — How to Enjoy It. Alma D. MacConomy (Ed.), National Wildlife Federation, Washington, D.C. 1977.

Magazines/Newsletters

American Hiker newsletter. American Hiking Society, 1701 18th St., N.W., Washington, D.C. 20009.

Backpacker. P.O. Box 2784, Boulder, CO 80322.

Camping Magazine. American Camping Association, Bradford Woods, Martinsville, Ind. 46151.

Outdoor American and the *Outdoor Ethics* newsletter. Izaak Walton League of America, 1701 Fort Myer Drive, Ste. 1100, Arlington, VA. 22209. Feature articles follow broad categories in outdoor recreation and conservation; quarterly.

Outsider. P.O. Box 2690, Boulder, CO 80322.

Sierra. 730 Polk St., San Francisco, CA 94109.

Organizations, Associations, etc.

L.L. Bean (Freeport, ME 04033). Write for free catalog of camping equipment, clothing and footwear.

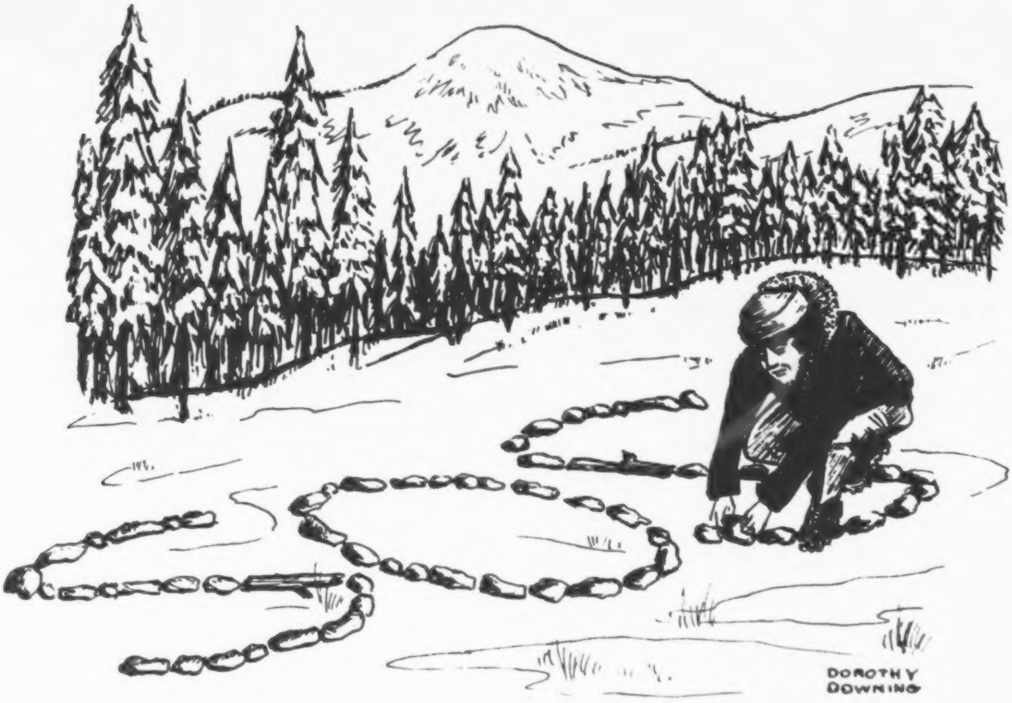
Local Mountain Shops and/or Sports Stores. Provide booklets, films, videos, catalogs, demonstrations, and maps on camping tips, nearby trails, equipment, etc.

Recreational Equipment, Inc. P.O. Box C-88125, Seattle, Washington, 98188. Write for free catalog of outdoor recreation equipment.

U.S. Forest Service Office. Ask for booklets, pamphlets and maps on camping, trails and regulations.

Your State Wildlife Conservation Agency. Request list of available booklets and pamphlets on camping and hiking.

DOROTHY DOWNING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DOWNING

CHAPTER 10

Survival

Topic Outline

- I. Controlling Your Mind
  - A. Priorities of life
    - 1. Will to live
    - 2. Air
    - 3. Shelter
    - 4. Rest
    - 5. Water
    - 6. Food
  - B. Fear
    - 1. Common fears encountered
    - 2. Controlling fear
- II. Maintaining Physical Well Being
  - A. Shelter
    - 1. Clothing
      - a. Types
      - b. Usage
    - 2. Natural
      - a. Types
      - b. Usage
  - B. Fire
    - 1. General procedures
    - 2. Fire starting systems
  - C. Water
    - 1. Dehydration
      - a. Cause
      - b. Prevention
    - 2. Acquiring
  - D. Food
    - 1. Types
    - 2. Usage
    - 3. Acquiring natural foods
- III. General Survival First Aid
  - A. Basic Procedures
    - 1. Removal from dangerous situations
    - 2. Ensuring breathing
    - 3. Controlling bleeding
    - 4. Splints, dressing, and bandages
  - B. Temperature Problems
    - 1. Cold
      - a. Hypothermia
      - b. Frostbite
    - 2. Heat
      - a. Heat stroke
      - b. Heat cramps
      - c. Heat exhaustion
- IV. Getting Back Alive
  - A. Natural techniques
    - 1. Sun
    - 2. Stars
    - 3. Landmarks
  - B. Map and compass
    - 1.· Compass use
    - 2. Map reading
  - C. Being found
    - 1. Basic principles
    - 2. Signalling devices
  - D. Survival kits
    - 1. Circumstances for use
    - 2. Materials
    - 3. How to use

Introduction

OVERVIEW

Survival represents one's ability to minimize the stress of a life-or-death situation to a level of mental and physical tolerance. Today's "get-away" society provides us with ways to escape the sophistications of technology. Yet, once caught without the security of conveniences, we realize too late that our self-sufficiency is often less than expected.

The purpose of this unit is to improve self-reliance and self-discipline in students. The basic principles of wilderness survival are transferable to everyday life. So while we develop the skills and abilities to survive a wilderness emergency, we are also building the self-confidence in students necessary for them to more fully enjoy the sports of the out-of-doors described.

APPROACH

It is difficult to simulate in the classroom the true nature of an unexpected disaster. Therefore, it is vital to stress the seriousness of each lesson by adding as much realism as possible. Encourage personal anecdotes, cut out newspaper articles, and create situations which easily apply to your local setting.

When teaching survival, the "know-it-all" can be a real problem. Instead of a learning situation it becomes a contest between the teacher and students. You can avoid this by pre-testing their knowledge with hypothetical situations. But most important, know what you're talking about. If a survival course is offered in your community, take it. Otherwise a good survival test will suffice for now. (See Reference List on page 178.) Keep in mind, however, that survival is not simply edible plants and woodcraft — survival is mostly *mental*.

As a final note, remember our overall philosophy: To develop respect for the land. Man against nature in real life emergencies may justify certain "destructive" actions, but in a learning situation, stress the "leave-no-trace" ethic.

Curriculum Lesson Ideas

Topic I. Controlling Your Mind

GENERAL BEHAVIORAL OBJECTIVES

The student will be able to:

Objective A: Understand the relationship between the priorities of life and the sequence of survival techniques to use.

A-1 WHAT YOU NEED TO LIVE

Ask students to list the priorities of life in order of importance for given survival situations. Discuss how long you could live without air, water and food. In a pressing situation, how long would you live if you decided your situation was hopeless? Why would your mind be the most important survival tool?

A-2 SIMULATION: ASTRONAUT'S MOON PROBLEM

To improve the students' ability in making priority decisions and working together with others, divide them into four groups of eight. First ask individuals to make a prioritized list of the astronaut's survival items, then a group list, then combine two groups to make a list and then make a final class list on the board by combining the last two group lists.

Note how the situation's conditions have to be carefully determined first and how personalities play an important role in working out solutions. (See directions at end of chapter.)

Objective B: Recognize and understand methods of controlling common fears.

B-1 AFRAID OF WHAT?

Ask students to list things they would fear in a given survival situation. Make a master list on the board of most common fears. Include such things as fear of: animals, darkness, noises, silence, being killed, "get-home-itus," suffering, ridicule from peers, etc.

Discuss how fears can be used to your advantage.

Topic II. Maintaining Physical Well Being

GENERAL BEHAVIORAL OBJECTIVES

The student will be able to:

Objective A: Improvise, by any means possible, shelter to protect the body from harmful natural elements.

A-1 SURVIVAL TOOLS AT HAND

Given a situation, ask students to determine need priorities, be it protection from wind, rain, sun, cold, heat or other hazards and discomforts.

Hand out cards with objectives written on them like: protect the eyes, keep your head warm, soothe your blisters, keep dry, etc. Tell them what they have and what's around and ask them to improvise. Include such things as using extra wool socks for gloves, a garbage bag for a poncho, birch bark for sunglasses, rose hips for Vitamin C, rags for footwear and headwear, etc.

A-2 GIVE ME SHELTER "AU NATUREL"

Finding a suitable spot for and constructing a natural shelter with limited tools is indeed a challenge. During a field trip, ask teams of students to pick a shelter site and have them decide how they would build it. Visit each site with the class while that team describes and defends their choices for location, materials and construction.

Bring suitable sticks, and a space blanket to class to discuss the principles of building a small lean-to to maximize the conservation of body heat.

Objective B: Start a suitable survival fire under varying conditions.

B-1 TO BUILD A FIRE

Impress upon students the serious nature of fire building abilities during an emergency. Have them describe the best source of firewood in: a wet or damp environment, wood-barren environment, or snow-covered environment.

Ask each student or team of students to assemble what they feel would be needed to start a fire. Go over the importance of carefully gathering dry tinder, kindling and fuel wood in three piles and keeping fires well supplied with oxygen.

Under strict supervision, hold a fire building contest using one match, 00 steel wool and a steel match, or a candle and fuzz stick.

B-2 FAMOUS *LAST* WORDS: MY MATCHES ARE WET!

Talk over the importance of back-up fire starting systems, such as a petroleum lighter, steel match, flashlight batteries and 00 steel wool, camera lens, shotgun shell powder, etc. Ask each student to design a unique system for homework. Advise *caution* with gunpowder or fuels in sawdust. You might want parental permission first.

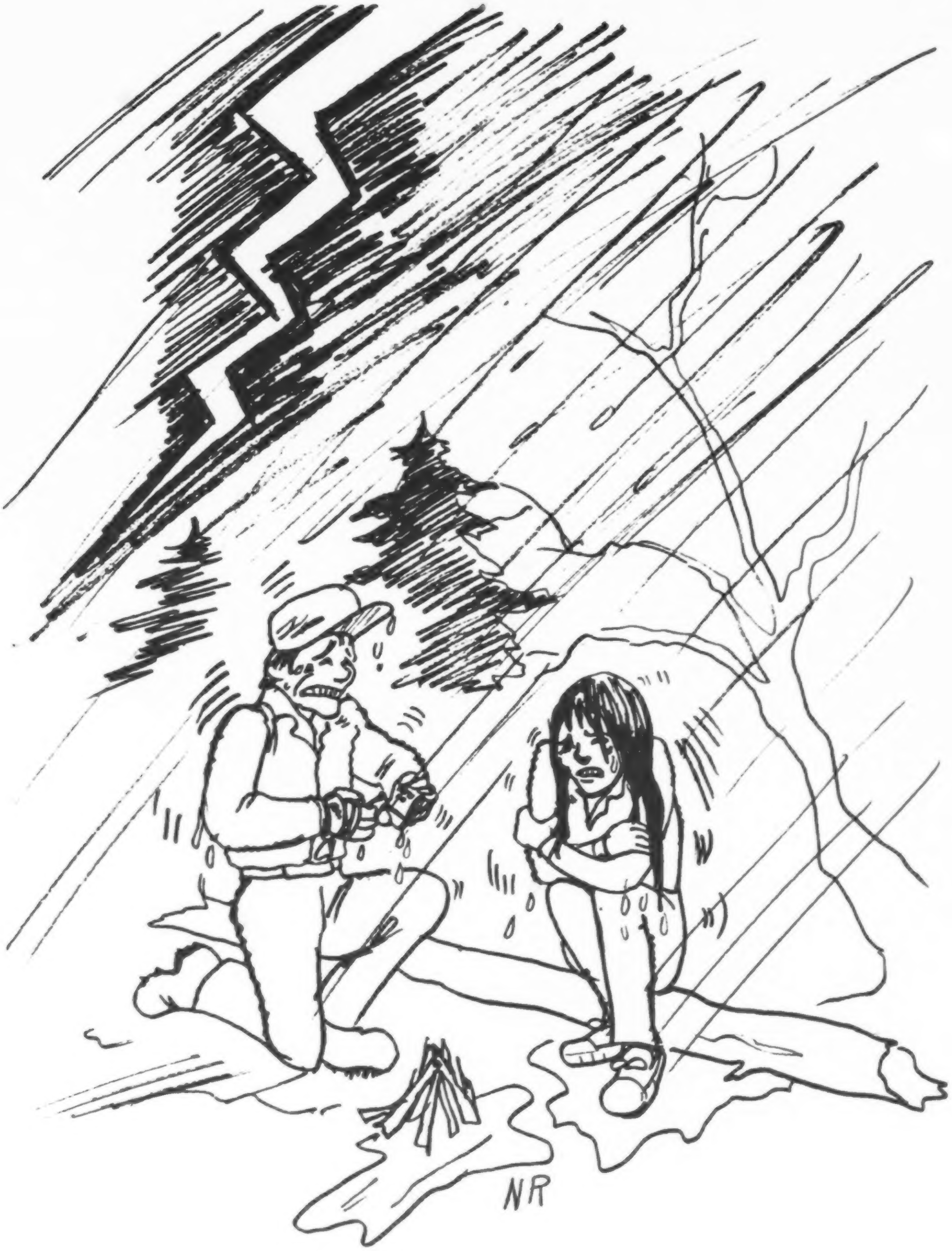
For a class activity, have students demonstrate the utility of their systems.

Another activity possibility involves making back-up systems in class such as coating kitchen matches with wax and twine fiber.

Go over techniques for building non-wood fires using hub-caps, sand and gasoline or tin cans containing animal fat.

B-3 WET WOOD RELAY

Divide students into teams of two or three. Give each group *wet* matches, paper and wood for a fire. Have a race to see which team can safely light a flaming fire and keep it going for five minutes.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Objective C: Appreciate the value of water by knowing the consequences of doing without it and the difficulty of acquiring it in dry environments.

C-1 DRY UP!

With the human body being approximately 75 percent water, its importance in survival is obvious. Discuss with students the ways humans lose water and how they might conserve it. Ask them the significance of the statement, "ration sweat, not water."

Go over the three stages of dehydration, including warning signs like apathy, yellow urine and spasms. Discuss ways of conserving body water, including resting, finding shade, and keeping the mouth shut.

C-2 ACQUIRING WATER

There are many methods of acquiring water from digging to setting up vegetation water stills.

As a class activity, have groups use selected survival reference material for directions in still (water) construction. If conditions permit, go out to build them. (You can build models for class discussion.)

Discuss other ways of finding water, such as "wagon-wheel spoke patterns" in the desert from animals, plant indicators, dried up stream beds, and the topography.

Objective D: Appreciate the value of wild plants and animals as possible food sources.

D-1 SURVIVAL FOOD

Although food is low priority in terms of survival, the topic seems to be most interesting to students.

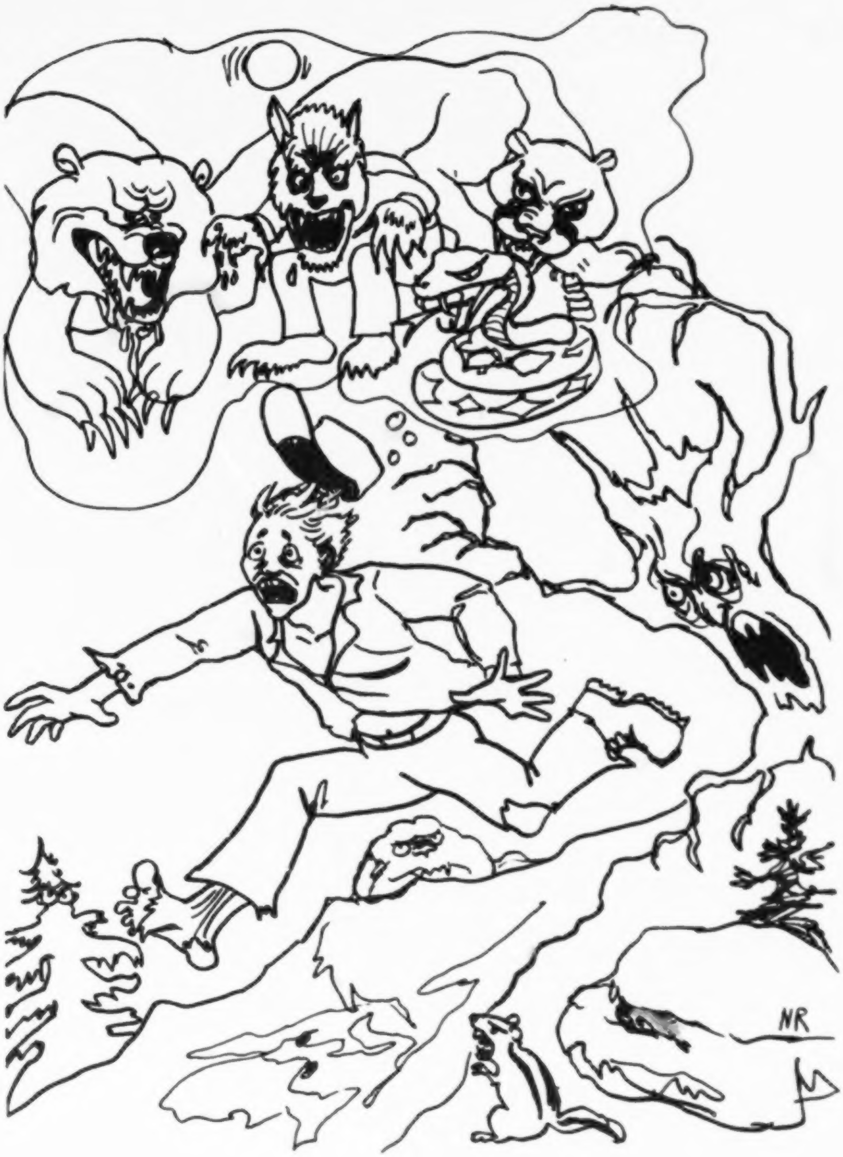
The best way to learn wild edible plants in your area is by having an expert take you on a field trip to point them out. There are books and visual aids on the subject, but because of the large variety of poisonous plants around, it pays to have the first-hand experience with the expert. You might want to collect, dry and display both edible and poisonous plants. Supply index cards with the many uses written out. Have students do the research.

Discuss the procedure one would use to test whether or not a plant is edible.

D-2 TRAPS AND SNARES

Most animals are edible if you can force them down, and surprisingly, insects may be the most suitable. However, be sure students are aware of the diseases animals carry.

For an interesting class activity, student teams could assemble and demonstrate various types of traps, deadfalls and snares. Exercise caution with some of these techniques — especially when making primitive weapons. Be sure to stress that these are to be used only in emergencies, at other times they may be illegal!



Scared to death.

Topic III. General Survival First Aid

GENERAL BEHAVIORAL OBJECTIVES

The student will be able to:

Objective A: Demonstrate knowledge of the basic essential first aid procedures.

A-1 SAVING A LIFE

The emphasis here is not much different than what is covered in a basic first aid course except for unique circumstances one would encounter in the wilds.

Invite a first aid instructor to class to demonstrate techniques for removal, controlling bleeding, and mouth-to-mouth resuscitation.

A-2 STANDARD FIRST AID COURSE

First aid certification can now be attained through the use of visual aids and programmed learning. It would be well worth the effort to put the class through such a program.

Objective B: Demonstrate awareness of the dangers associated with body temperature problems.

B-1 DR. HYPOTHERMIA

Invite a physician in to explain the cause, prevention, symptoms and treatment of hypothermia.

B-2 COLD ACTING

After students understand the symptoms of hypothermia, divide them into teams of two or three. Ask each group to act out one of the stages of hypothermia.

After all groups have finished, have the class place the stages in order of occurrence, and give preventative and treatment measures for each stage.

B-3 SILENT KILLERS

The danger of body heat loss is often overlooked until it's too late. Hypothermia is a common killer of the unprepared. Discuss with the class the causes, symptoms and reviving techniques. You may have students act out a set of symptoms for the class to identify and prescribe actions for.

Remember, wind and wetness can kill someone at 50°F.

Frostbite is another problem at cold temperatures. Discuss the symptoms and method of frostbite care (do not exercise frostbitten areas). What is the difference between freezing to death and death from exposure?

Mother nature isn't always so kind. . . know the dangers of hypothermia

B-4 BEATING THE HEAT

A standard first aid manual discusses the meaning, causes and cures for heat stroke, heat cramps and heat exhaustion.

Have students team up, ask each team to identify the problem when given symptoms, and discuss the best method of prevention and cure.

Topic IV. Getting Back Alive

GENERAL BEHAVIORAL OBJECTIVES
The student will be able to:

Objective A: Demonstrate skill in using natural objects to determine general directions.

A-1 I'LL FOLLOW THE SUN

Although many natural techniques are not too reliable, one can obtain an idea of direction by the sun. See Activity A-1 at end of this chapter for directions.

A-2 THE OLDEST COMPASS KNOWN

If a planetarium visit is impossible, you could demonstrate how to find directions by using stars with a star chart at night. The North Star is best to use, so make sure students can recognize it at various times of year and of night.

A-3 LANDMARKS....BUT S.T.O.P.

An experienced outdoorsman knows the value of remembering conspicuous landmarks as he travels. The novice can get quite confused. Impress upon students the most important means of getting back alive — that is, using the S.T.O.P. procedure.

Stop	Stay put as soon as you realize you're lost.
Think	Think about controlling your fears and the situation.
Observe	Look around to determine your priorities and what resources are available.
Plan	Map out a detailed itinerary of how you will make best with what you have. Cope with it.

As a follow-up to this procedure, test students by giving them simulated situations written on index cards. Ask them to describe the details of the S.T.O.P. procedure to best fit the conditions.

Objective B: Demonstrate ability to use a map and compass for finding direction in an unfamiliar area.

B-1 FUN WITH DIRECTION

A compass game can be devised by marking 10 stations off at equal intervals along an east-west line of a predetermined length. Starting from each station, measure off a set of compass directions and specific distances (be sure to write this down on a separate sheet for each station) so that you return exactly at another station.

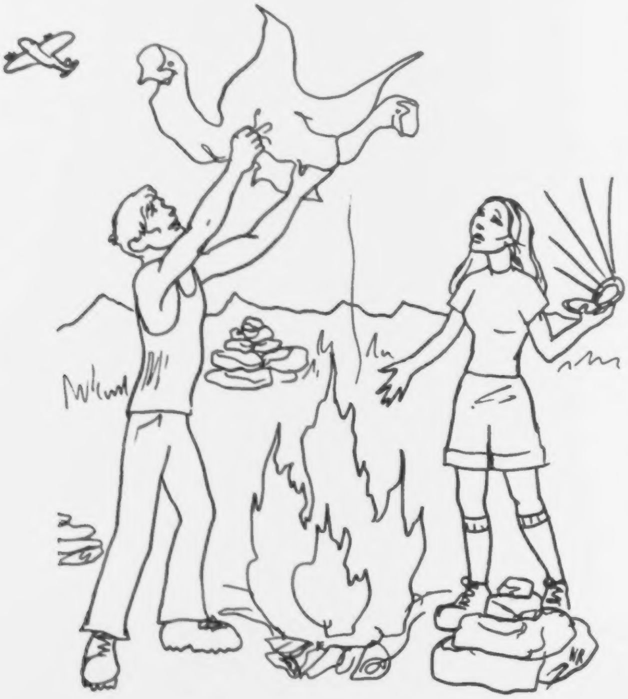
Make copies of these directions for each station and keep a master answer sheet noting where each "station walker" will end up. For example, starting from station 1, going three yards at 315°, then three yards at 90° and again three yards at 225° should bring you back to station 1 again.

Landmarks have to be used to keep you on course, and a pace has to be measured to determine distance. Bent coat hangers with numbered index cards attached serve as good station markers.

B-2 READING TOPOGS

The contour lines on topographic maps can be a real problem for students to interpret. The concept can be demonstrated by using a standard bread size pan, an irregular "mountain-shaped" object placed inside (hardened plaster of paris), and a marking pen.

Fill the pan with water at ½-inch intervals while marking with pen the water/plaster of paris interface at each interval. Continue until you have totally covered the "mountain." Drain the water.



The more signals, the greater your chances are.

Looking directly down on the "mountain" notice the relationship between the closeness of lines and steepness of slope.

Using actual contour maps of your area, have students find answers concerning distances, slopes, elevations, and symbols. Practice using map and compass together. Organize an orientation meet.

Objective C: Demonstrate how to expedite rescue by being conspicuous and utilizing signalling technique.

C-1 BEING CONSPICUOUS — THE *LIVING* GIVEAWAY

Review the S.T.O.P. procedure and stress the need for making yourself conspicuous. Discuss the fact that most lost persons are found within two or three days.

Ask students to describe how they could make their presence known. Include location, noise, smoke and markings.

C-2 SIGNALLING DEVICES

If your budget can absorb it, it makes for an interesting activity to test the effectiveness of various commercial signalling devices such as flares, sirens, and smoke bombs. Compare the effectiveness of different colors for observation distance.

Demonstrate and practice using signal mirrors. They can be made from scrap mirror for $2 for about 10.

Discuss how three of anything is the universal emergency code. What natural means are available for signalling?

Objective D: Assemble and demonstrate how to use a survival kit.

D-1 THE JACK OF ALL TRADES

Students find great satisfaction in putting together their own survival kit. As a pre-activity discussion, mention the purpose and components of a survival kit. Kits can range in size from a film can to a large suitcase, so emphasize the importance of first determining its purpose.

There is room here for plenty of imagination. Anything from a band-aid to a guitar C-string is practical depending on its use (A G-string makes an excellent small animal snare.) Remember the priorities of life for setting guidelines.

Note to the teacher:

Following completion of the activities in this chapter on survival, students should be able to compile a list, similar to the following, identifying items necessary for a well planned and successful trip.

Clothing/equipment lists

Winter:

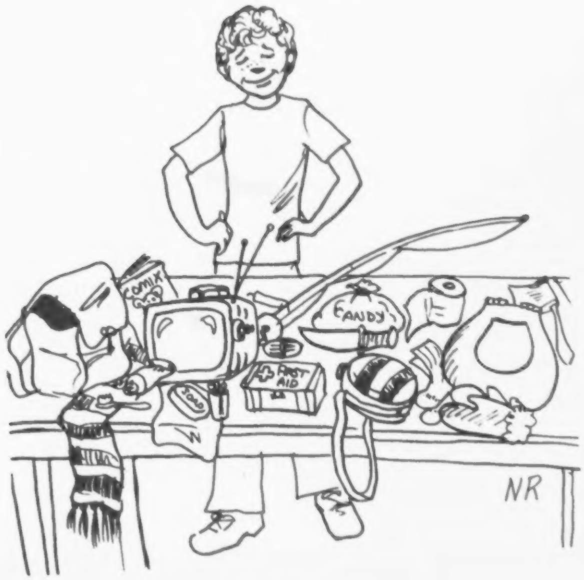
- wool hat and gloves
- insulated jacket
- wool shirt
- wool socks
- wool sweater
- long underwear (thermal)
- boots (waterproof)
- pants (corduroy or wool)
- wind/rain gear

Summer-Spring-Fall:

- rain gear
- wide brim hat
- lightweight shirt
- lightweight pants
- windbreaker
- wool shirt/sweater
- wool socks
- cotton socks
- boots

General:

- map and compass
- matches (in waterproof container)
- whistle
- knife
- first aid kit
- mirror
- food and water


COMIX
CANDY
FIRST AID
SOAP
NR

Let's see, what did I forget?

Activity A-2
Survival, Topic I, A-2
"SIMULATION: ASTRONAUT'S MOON PROBLEM"

Time: One class period

Instructions: You are a member of a space crew originally scheduled to rendezvous with a mother ship on the lighted surface of the moon. Due to mechanical difficulties, however, your ship was forced to land at a spot some 200 miles from the rendezvous point. During re-entry and landing, much of the equipment aboard was damaged and, since survival depends on reaching the mother ship, *the most critical items available must be chosen for the 200-mile trip.* Below are listed the 15 items left intact and undamaged after landing. Your task is to rank order them in terms of their importance for your crew in allowing them to reach the rendezvous point. Place the number *1* by the most important item, the number 2 by the second most important, and so on through number *15*, the least important.

Survival Items	Your Priority	Small Group Priority	Answers
Box of matches			15
Food concentrates			4
50 feet of nylon rope			6
Parachute silk			8
Portable heating unit			13
Two .45 caliber pistols			11
Once case dehydrated milk			12
Two 100 lb. tanks of oxygen			1
Steller map (of the moon's constellation)			3
Life raft			9
Magnetic compass			14
5 gallons of water			2
Signal flares			10
First aid kit contianing injection needles			7
Solar-powered FM receiver-transmitter			5

Activity A-1
Survival, Topic IV, Activity A-1
I'LL FOLLOW THE SUN

Time: 30-45 minutes

Purpose: To locate north and south without the use of a compass

Materials:

Three-foot-long stick
Accurate watch
Sunshine

Helpful Hints:

1. This activity should follow a map and compass activity.
2. Discuss the importance of knowing directions when travelling in unknown areas.
3. Describe to students the various methods they could use to find north and south without the use of a compass. Discuss the reliability of each method.

Procedures:

1. Have everyone close their eyes and spin around a few times. With eyes closed, ask them to point to the North Pole. With positions held, open eyes and note the variety of directions pointed to.
2. Discuss why they might have been off without the use of visual landmarks. Stress the similarity of being lost in strange surroundings.
3. With the aid of a stick, locate north and south using the following method:
   a. Place stick in ground vertically. Mark end of stick's shadow with small twig.
   b. Wait 30 minutes and then mark end of stick's new shadow with another twig.
   c. Draw a straight line connecting the two twigs.
   d. A line drawn perpendicular to this "twig line" is going approximately north and south, with south being on the stick side of the "twig line."
   e. Check this line with a compass.
4. Obtain a watch showing the correct time. Using the following method, determine north and south:
   a. Point the hour hand toward the sun.
   b. Draw a line which is halfway between the hour hand and the direction 12 noon is in.
   c. South is half way between the hour hand and twelve.

d. Check this direction with a compass.

Questions To Ask:

1. Were either of these methods very accurate?
2. How far were they off according to the true compass directions?
3. When might you be forced to use such methods?
4. How might the stick and watch methods be useful to you? Describe those possible situations.

Reference List — Survival

Books

Be Expert with Map and Compass: The Orienteering Handbook. Bjorn Kjellstrom, Scribners, N.Y. 1976.

Being Your Own Wilderness Doctor. E. Russel Kodet and Bradford Angier, Stackpole, PA. 1975.

Emergency Survival Handbook. Outdoor Safety League Staff, Mountaineers, Seattle.

First Aid: Quick Information For Mountaineering and Backcountry Use. Write The Mountaineers, 715 Pike St., Seattle, WA 98101.

Food for Sport. Nathan J. Smith, Bull Publishing Co., Palo Alto, CA. 1976.

Hypothermia. William Forgey, M.D., ICS Books, Merrillville, IN. 1985. An outdoor medical expert explores the causes, methods of prevention, advances in equipment and clothing, treatments, hospital care, and the basic physiology of hypothermia.

Land Navigation Handbook. The Sierra Club Guide to Map and Compass. W.S. Kals, Sierra Club Books, San Francisco. 1983.

Mountaineering First Aid. 3rd Ed. Jan Carline et al. (Eds.) The Mountaineers, Seattle, 1985. Covers preparation for an accident, accident response, legal implications, first aid, evacuation, and references.

Mountaineering Medicine. 10th Ed. Fred T. Darville, Jr., Wilderness Press, Berkeley. 1983.

Orienteering. 2nd Ed. John Disley, Stackpole Books, Pa. 1979. The sport of orienteering from getting started to competition, including training games, equipment and fitness training.

Outdoor Survival Skills. 4th Ed. Larry D. Olsen, Brigham Young Press, Provo, UT. 1973.

Surviving the Unexpected Wilderness Emergency. Gene Fear, Survival Education Association, Tacoma, WA. 1973. Easy to understand explanation of how to survive any type of survival situation from analysis to evacuation. Suggested survival kits, recommended books and films.

The Survival Handbook. W.K. Merrill, New Century, Piscataway, N.J. 1972. Very thorough for every climate and terrain in any situation. Includes kits, edible plant identification, lean-to construction, signals, knots, poisonous plants and animals, hunting small game, etc.

You Can Survive. H.C. Wells, Box 2480, Pasadena, CA. 91105. 1977

Wilderness Helps. Ron Dawson, OMNIgraphics Ltd., P.O. Box 160, Post Falls, Idaho, 83854. Five pocket-size manuals including survival, edibles and first aid.

Organizations, Associations, etc.

Missouri Dept. of Conservation (Outdoor Skills Education Unit, P.O. Box 180, Jefferson City, MO. 65102-0180). Ask for brochure on their "Outdoor Skills Education" program.

Your State Wildlife Conservation Agency. Request list of available booklets, pamphlets and films on survival as there are some very good ones available.

U.S. Forest Service Office. Ask for booklets, pamphlets and films on survival and hypothermia.

Local Mountain Shops and/or Sports Stores. Provide booklets, and films on survival.

Alan Madison Productions, Inc. (Red Rock Rd., P.O. Box 100, Chatham, NY 12037). Excellent film, "Survival!", available which re-enacts wilderness emergencies including hypothermia, weather-related accidents, dehydration, disorientation, and panic. Ask for other films on related topics.

Orienteering Services, USA (Box 1604, Binghamton, NY 13902). Ask for "Orienteering Teaching Aids Catalog" which lists compasses, books, games, posters, training kits and competition accessories.

Other Teaching Packages

Introduction to Topographic Maps. John H. Siebert, Hunter Safety Education, Dept. of Conservation (2901 W. Truman Blvd., Box 180, Jefferson City, MO 65102). Instructional package for those who have had no previous instruction concerning topographic maps. Includes illustrations and evaluation exercise.

Outdoor Survival: A Game About Wilderness Skills. Stackpole Books, Cameron and Kelker Sts., Harrisburg, PA 17105. Five games, Survival, Search, Rescue, Lost, and Pursue are played on one game board that represents woods, mountains, rivers, lakes, etc.

Computer software

Nationwide Computer Products (P.O. Box 61, 1380 S. Pennsylvania Ave., Morrissville, PA. 19067) Request list of computer software.

Yaker Environmental Systems, Inc. (P.O. Box 18, Stanton, N.J. 08885) Request computer software list on environmental topics.

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